REPORT RESUMES

ED 011 066 64
A DEMONSTRATION PROJECT OF PROGRAMED TELEVISION INSTRUCTION.
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REPORT NUMBER BR-5-1184 PUB DATE JUL 66
REPORT NUMBER NDEA-VIIB-482
CONTRACT OEC-4-16-034
EDRS PRICE MF-$0.27 HC-$7.72 193P.

DESCRIPTORS- *TELEVISED INSTRUCTION, *PROGRAMED INSTRUCTION, *PACING, *GROUP INSTRUCTION, *DEMONSTRATION PROJECTS, EDUCATIONAL OBJECTIVES, FILM PRODUCTION, GEOGRAPHY INSTRUCTION, NEW YORK CITY, DISTRICT OF COLUMBIA

A DEMONSTRATION PROJECT WAS BEGUN TO CREATE GROUP-PACED, PROGRAMED TELEVISION INSTRUCTION IN THE FORM OF A SHORT SERIES OF LESSONS DESIGNED TO ENABLE STUDENTS WITHIN A GIVEN TARGET POPULATION TO LEARN A SPECIFIC SET OF INSTRUCTIONAL OBJECTIVES. THREE GEOGRAPHY LESSONS WERE DEVELOPED THROUGH A PROCESS OF TESTING, REVISING, AND VALIDATING UNDER NORMAL CLASSROOM CONDITIONS IN SCHOOLS THAT REGULARLY USE INSTRUCTIONAL TELEVISION. THESE LESSONS AVOIDED THE "TEACHER-ON-CAMERA" TECHNIQUE AND USED ONLY THE VOICE OF THE TEACHER TO DIRECT ATTENTION TO CERTAIN ASPECTS OF THE VISUAL TEACHING DISPLAYS. ALONG WITH THE THREE-LESSON DEMONSTRATION SERIES, A 45-MINUTE FILM WAS PRODUCED WHICH CONTAINED EXCERPTS FROM THE FINAL VERSIONS OF THE THREE LESSONS AND WHICH ALSO SUMMARIZED THE FINAL IN-SCHOOL TESTING OF THE LESSONS AND THE PROCESS BY WHICH THEY WERE DEVELOPED. THE TEST POPULATION INCLUDED ELEMENTARY STUDENTS FROM 17 SCHOOL DISTRICTS IN THE DISTRICT OF COLUMBIA VICINITY. ALTHOUGH THE INVESTIGATOR INDICATED A NEED FOR DECISION CONCERNING THE RANGE OF ABILITY LEVELS TO BE TAUGHT BY ANY ONE LESSON, HE CONCLUDED THAT THE USE OF TELEVISION NEED NOT BE LIMITED TO ENRICHMENT PROGRAMING AND THAT THE LESSONS DEVELOPED HAD DEMONSTRATED THE EFFICACY OF GROUP-PACED, PROGRAMED TELEVISION FOR DIRECT INSTRUCTION. (GD)

U. S. DEPARTMENT OF HEALTH, EDUCATION AND WELFARE
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A DEMONSTRATION PROJECT
of
PROGRAMED TELEVISION INSTRUCTION

conducted by

The Institute of Educational Technology
Teachers College
Columbia University

with

WETA-TV Washington, D.C.

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Institute of
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Pursuant to Contract OE-4-16-034
United States Office of Education
Under Title VII (B) of the
National Defense Education Act

ED 011066

PREFACE

We are told constantly these days that we are living in the greatest period of change in educational history. The modest project reported in the following pages stands as still one more testimony to the truth of this statement.

First of all, this project was designed to help change the way in which television is used for the purpose of direct instruction. A second change to which it hoped to contribute is a much needed change in the view that programed instruction can only be implemented by means of individually paced teaching machines or a self-instructional programed textbooks. In attempting to do these things the Project was, in fact, trying to innovate within two recent educational innovations. Thus, the work reported here has been an attempt to introduce more change into an already rapidly changing educational system by pressing the limits of two of its newer elements; television and programed instruction.

But in addition to having "change" as its purpose, the reader of this report cannot help but be struck by the role that "change" played in the conduct of the Project, itself. For in a sense, the Project was a two-year parade of changes; changes in direction, content, process, duration and staff. All of which makes its director extremely indebted to those who were willing to live with and make important contributions to the carrying out of a "limit-pressing" undertaking. The list of those who made these contributions is long -- even a small undertaking designed to marry two technologies such as television and programed instruction requires the diverse skills of many individuals. Those who made major contributions to the work of the Project are:

Television and Audio-Visual Staff Members:

James Gugino, _et_ _al_. Television Crew
Robert D. Smith* - Production Director
James Solt - Television Director
Albert Drogin - Artist
Donald Pace - Announcer and Audio Consultant
Jerry Sukenick - Art Director

Programed Instruction Staff Members:

Bernard Basescu* - Programer
Mary S. Bernstein - Program Editor
Dr. H. Wayne Gustafson* - Programer
Dr. Edward J. Green Testing and Evaluation Consultant

Clerical Staff:

Verla Birrell
Mary Carter*
Peggy Zirker

*Associated with the Project for the first year only.

Members of the staff of the U.S. Office of Education who monitored the work of the Project and offered guidance, understanding and encouragement were Dr. Gerald Torkleson, Dr. Hugh McKeegan and Mrs. Gertrude Broderick. The Project Staff is also indebted to Dr. C. R. Carpenter, Penn State University, Mr. Edwin Cohen, The National Center for School and College Television at the University of Indiana, and Dr. Mark May, Yale University, whose valuable criticisms and suggestions carried the Project over a number of critical hurdles.

In addition to those mentioned above, the staff was also assisted by Atis Lillstrom, Jane Komoski and Georgea Pace who helped to score test papers during both the developmental and final testing phases of the Project; Howard Weinburg who helped to edit film; Frank Long of the Australian Consulate who arranged for the use of film of the Australian Aborigines. Finally, thanks are due to Myrtle Hooe who typed the final versions of production scripts and to Barbara Wilson who typed this manuscript.

P. Kenneth Komoski
P. Kenneth Komoski
Principal Investigator

Wayne Coy Jr.
Wayne Coy, Jr.
Project Associate and
Television Producer

July, 1966

TABLE OF CONTENTS

Page

INTRODUCTION

The Purpose and Background of the Project............ 3
The Original Plan and Its Modifications.............. 7
Some Arbitrary Decisions and Working Assumptions 13

CONTENT AND SCRIPT DEVELOPMENT

Content Development (and Chronology)................. 17
Narrowing and Restructuring the Content............... 25
Developing "Programed" Television Scripts............ 31

PRODUCTION

Producing the Script (Preparation of Visuals, Script Analysis, Pre-production Preparation)........ 38
Rehearsals (Studio Production, Why Videotape?)........ 54
Summary of Production Procedures..................... 66

TESTING AND REVISING

Test Population...................................... 67
Early Studio Testing (Procedures and Results)......... 69
Some Aspects of the Revision Process................. 74
The Revised Role of the Classroom Teacher............ 78
Producing the Revised Script......................... 81
Testing in Schools................................... 88
Constructing the Tests (Developmental and Final)...... 91
Summary of Test Results.............................. 97

CONCLUSION

The Project Ends at a Beginning...................... 108
The Filmed Report.................................... 111
Questions for Further Research....................... 112
The Impact of This Project on Others................. 114

APPENDICES

Appendix A: Two Versions of Portions of Lesson 1

Appendix B: Teacher's Guide

Appendix C: Final Pre- Posttest, Form A and Form B

Appendix D: Student Worksheets

Appendix E: Excerpt from "Working Paper #1" and
Excerpt from an Overview of "Six Videotaped Lessons on Human Ecology

INTRODUCTION

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THE PURPOSE AND BACKGROUND OF THE PROJECT

The purpose of the Project was to create a demonstration of group-paced, "programed" television in the form of a short series of lessons, designed to enable learners within a specific target population to learn a specific set of instructional objectives. These lessons were to be developed through a process of testing and revision, and validated under normal classroom conditions in schools that regularly use instructional television. The three lesson demonstration series produced by the Project is accompanied by a 45-minute film which contains excerpts from the final versions of each of the three lessons. The film also summarizes the results of the final in-school testing of the lessons and explains the process by which they were developed. The Project began July 1, 1964 and ended June 30, 1966.

This project was motivated by a desire on the part of the United States Office of Education to improve the effectiveness of television as a means of instruction, and to do this by demonstrating new ways of using television for direct instruction that could be copied and hopefully improved upon by other producers of instructional television. The Project was undertaken by the contractor with the assumption that, in spite of the current emphasis on the individualization of instruction, group paced instruction via television is, and can remain, a sound and increasingly effective educational practice. Proceeding on this assumption, the Project Staff set out to explore ways of exploiting the potential of television as a multi-channel (audio-visual) means of presenting instructional stimuli designed to elicit responses from learners that would result in the acquisition of specific learning objectives. Generally stated the learning objectives of the series of lessons produced by the Project are:

1. To have the learner create "a good overall description of a population" by identifying groups within it, which, in his judgment, give an accurate description of the makeup of that population.
2. To have the learner identify a number of "points of view" from which he (and others) may look at a population when attempting to describe its makeup and the changes that take place within its makeup over time.
3. To have the learner decide (as the result of a class assignment following Lesson 1) what points of view he feels ought to be used in describing any (or almost any) population.
4. To enable the learner to look at two different populations from the same points of view and compare those two populations by means of the groups he discovers as he studies them from the points of

view he is using. For instance, if asked to look at an American and an Asian population from the points of view of "religion", "diet" and "work", the learner would (after studying the two populations) come up with comparative lists of religious groups, groups related to diet or eating habits, and groups related to work.

Another purpose of the Project was to apply various research findings that (over the last generation) have indicated that techniques such as having learners respond orally or in writing during instruction will improve the teaching effectiveness of group-paced, audio-visual lessons. These techniques have since become a common element of all so-called "programed" instruction. Because much of this research pertaining to the improvement of audio-visual instruction has been conducted with older students or adults, and because it has dealt with the teaching of a limited number of facts or a single, highly discrete concept, taught in a single lesson, this project was designed to apply these research-generated techniques in a series of lessons for elementary school children in contrast to their application in single 20 or 30 minute lessons using adults or high school students as test subjects.

In creating these lessons the staff set itself the task of building lessons that did not use the familiar "teacher on camera" technique of instruction, but used only the voice of "the teacher" to direct the learners attention to certain aspects of the visual teaching displays.

Perhaps the most important aspect of this project was a commitment to create television lessons by means of a process of developmental testing early versions of lessons on small groups of students and revising them after such tests and prior to testing them with larger groups under normal classroom conditions.

In addition to improving reaching effectiveness, this testing was designed to enable the project staff to better estimate what skills and understandings relevant to the study of human geography could be learned in from two to three hours of "programed" television. In many ways, the Project became, primarily an exercise in empirically establishing just how many of those "basics" could be taught to average and above average fifth graders in approximately two hours of television instruction divided among three lessons.

THE ORIGINAL PLAN OF THE PROJECT AND ITS MODIFICATIONS

Like many projects that are undertaken for the express purpose of breaking new ground, this project set out with a working plan that had to be modified as the Project progressed. The initial modifications in this plan, as well as various subsequent changes were due almost entirely to the difficulty of specifying content and translating that content into objectives that could be learned by fifth graders during approximately two hours of instruction .

Originally the Project was to last for only one year and its goal was to develop not two, but three hours of videotaped instruction in human geography divided among six, one-half hour lessons. The orginial objectives of these three hours of instructions were contained in a thirty-six page curriculm outline created by the Project's content specialist, which he prophetically labeled "Working Paper #1". The original six were to be created by translating this statement into a set of behavioral objectives and then building audio-visual "programs" that would enable a "self-contained" series that was to be designed to function independent of the classroom teacher. This original strategy calling for no participation on the part of the classroom teacher was not an overt attempt to ignore the potential of the teacher as a necessary complement to televised instruction, it was simply a plan the staff thought would enable them to test the effectiveness of their work in as "uncontaminated" a fashion as possible. As the Project proceeded, the idea of not involving the classroom teacher was abandoned in order to allow the teacher to work with the students in carrying out tasks that were assigned to them during the last portions of the first two lessons. These tasks, which will be described in Section IV, were too long to be completed during the course of the television lessons themselves. Therefore, the teacher was requested to supervise the completion of these two assignments. The assignments were in effect responses that were led up to during the lessons but were either too complex to be completed or confirmed during a television program.

The original plan of developing six half-hour lessons called for the specification of the content of each lesson and the outlining of six "programed" scripts in terms of the responses the students were going to be expected to make during each lesson. This task was to be completed prior to the writing, production, and videotaping of the first lesson. Although this strategy seemed quite reasonable, it called for the making of a number of decisions about what could be learned by sixth graders from six half-hour lessons which the staff at that point was hardly in a position to make. Nevertheless, these decisions were made and the responsibility for the development of the six scripts was divided between two staff members who were both experienced programers. As these six scripts were in the process of being outlined the Project Director decided that a portion of Lesson 1 should be produced as soon as possible in order to give the programers and others of the staff who had not worked with television an opportunity to learn some of the possibilities and limitations of what for them was a new medium. This decision was prompted also by a desire to try to estimate how much stimulus material and how many responses could be reasonably included in a half hour televised lesson. This decision resulted in the production and testing of a 17-minute segment of a first version of Lesson 1, four months after the beginning of the Project. This segment was tested on a group of fith and sixth graders, and although it taught the students reasonably well, an analysis of its content made it amply clear that it was not going to be possible to teach as much in three hours of televised instruction as had been originally projected by the Project Staff.

Thus it was decided to drop a number of the objectives contained in the "working paper" that had been developed by the Project's Content Specialist. In addition to this modification, it also became necessary to abandon the original production strategy of outlining, scripting, and producing six programs on a simultaneous basis. This was necessary because of the difficulty of estimating how long it was going to take to teach a particular portion of a lesson until that portion had been produced and evaluated (and invariably modified) by means of student testing.

From the eighth through the fifteenth month of the Project five more versions of a first lesson were designed, recorded on videotape and tested with groups of students ranging from 6 to 36 in number. During this time analysis of the student trials with these various versions seemed at first to indicate that what had originally been thought of as reasonable objectives for Lesson 1 would require at least two lessons. However, as these objectives were more thoroughly analyzed it was decided that perhaps even part of a third lesson would have to be devoted to what had originally been designed as Lesson 1. This called for a final modification of the organization. When completed it appeared that the objectives would require three lessons of varying lengths (one of about half-hour and two close to forty-five minutes). This meant that almost two of the original three hours of instruction that had been projected over six lessons would be taken up by three lessons that would deal with little more than what had been originally considered the objectives of only part of one lesson.

As this redesign got underway, it was also decided to develop the lessons for a target population of average to above average fifth graders rather than six graders because two newly established state-wide social studies curricula placed the content at the fifth grade level and because fifth graders had done as well as sixth graders during early trials of the lessons. At this point the members of Advisory Committee for this project (Dr. C. R. Carpenter of Penn. State University, Mr. Edwin Cohen, Director of the National Center for School and College Television and Dr. Mark May of Yale University) recommended to the Office of Education that these three lessons be produced in a final form and tested under normal classroom conditions. They further recommended that instead of continuing with the further production of another hour of instruction that the remaining production resources be devoted to creating a filmed report of the Project. It was the Committees' feeling that the Project had demonstrated what it had set out to demonstrate, and in the process had accumulated both successes and failures that ought to be communicated to others who were interested in adopting or adapting the approach to television that had been taken by this project. It is important to note that these major modifications, in the original plan of the Project resulted from the virtual impossibility of specifying the objectives to be covered in the later lessons of a series designed to teach cumulative skills, information and principles before knowing how much of the earlier lessons would have to be devoted to the teaching of initial or underlying learning. This problem is, of course, present to an extent in the design of all instructional materials, but the problem becomes much greater when instruction is literally locked into a limited amount of time. This, of course, must be the case with a series of group-paced audio-visual lessons. However, the problem becomes acute when such lessons must be designed to teach a specified set of instructional objectives to a specified population of learners, in a specified amount of time. This is the "box" in which the members of the Project Staff found themselves - a box into which they couldn't simply jam their original but too ambitious objectives in order to simply "cover the ground". This might have been done with relative ease with "enrichment" or "resource" lessons, but it could not be done once the responsibility had been accepted to instruct rather than simply to "enrich". Having accepted the responsibility to instruct, the staff was faced with cutting down their objectives to fit the box they found themselves working in.

Needless to say, this frequently proved to be a most frustrating experience, and one which, at times, made the entire undertaking very discouraging. Nevertheless, despite the limited and frequently modified objectives that in the end were achieved by the Project its results leave little doubt that group-paced audio-visual instruction can be effectively programed for television and that it holds great promise as a means of exploring the largely untapped instructional potential of that medium.

SOME ARBITRARY DECISIONS AND WORKING ASSUMPTIONS

1. A decision was made before the Project began not to compare programed television lessons with either printed programed materials or a "programed lecture".

2. A decision was made not to use the teacher on camera. This was a definite break with the predominant format of instructional television. The decision was based on a desire to exploit television as a audio-visual means of communication.

3. The decision to use videotape rather than film to create this programed television series was based on the following assumptions.

   - Videotape offered more flexibility than film.
   - Videotape will eventually become the most commonly used medium for recording picture and sound in education.

4. The decision to use high quality cameras and supporting equipment was based on the assumption that in the future lower priced equipment that will perform as well as that used on this project will be in general use in education.

5. The decision that the content of the series would be social studies was made because both programed instruction and instructional television have tended to stay very close to "safe" factual content or content or very discrete conceptual material (i.e., a scientific principle, a mathematical concept such as "set", or a mathematical operation).

6. The decision to create a short series of lessons building one upon the other, rather than independent lessons "single concept" sequences was made because most previous demonstration projects have been limited to single lessons.

7. The decision to arrive at content by asking a practicing human geographer the following question: "Given three hours of instruction with fifth or sixth graders, what would you teach them that would be most helpful in their future study of human geography?"

8. The decision to employ a worksheet for written responses by the students. This decision was based on a desire to have a record of responses and a desire to increase student involvement, and, in so doing have each create a "set of notes" in the form of his completed worksheet.

9. An initial decision to have all responses written was made to insure reliable feedback from learners. This was later modified because of the time required for the writing of every response.

10. The decision to have only certain responses written and also to use spoken responses was made on the assumption that the rhythm and pace of the lesson would be improved by varying response modes. In this decision we were guided by the research of Goldsmith and Cummings on student response.

11. The decision to use a completely blank screen during the time the learners are responding was entirely arbitrary

and, to our knowledge, is new to television.

12. The decision to use the following low-cost reproduction devices was quite arbitrary (i.e., more expensive methods could have been used):

a. Standard light box and diazo printer (rather than photos).

b. Prestype or handlettering.

  1. Maximum flexibility.

  2. No special equipment necessary.

c. Pen and ink drawings.

13. The pacing of content was initially based on intuition and experience; modified by testing of lesson with students.

14. We decided to use stock film and stock photos whenever possible in order to keep costs down and to make as much as possible of existing resources. (Our idea was that we wanted to do what others would be able to do on small budgets.)

15. The assumption was made that despite the fact that instruction in this series would be in an audio-visual mode, and, despite the fact that many of the responses made by the learners would be made in the form of discriminations between or among visual elements on the screen, the final responses (i.e., the responses expected of them on a final test) should be written, verbal responses. The fact that many of these test questions would require the learner to write what he had learned audio-

visually may seem inappropriate, or even unfair, but our working assumption was, and is, that, given the existing educational system a learner must be able to respond in writing to written questions or he will not be given credit for knowing what he knows. By accepting this mode of testing, we consciously rejected the possibility of testing the learner in the medium in which he had been taught.

CONTENT
AND
SCRIPT
DEVELOPMENT

CONTENT DEVELOPMENT

The content or instructional objectives of this series might have been taken from any portion of the fifth or sixth grade curriculum, and, considering the nature of this project, there was every reason to choose a portion of the curriculum which contained a relatively discrete or self-contained material that would not be too complicated, highly visual, and easily programed. However, this sort of content was rejected on the grounds that it would be too much of a "set-up" for the kind of television instruction we wished to demonstrate. What we wanted to do was to work in a curriculum area that would test the limits of both the television medium as well as the "programed" approach to that medium that we wished to demonstrate.

The content we decided upon did, indeed, have the characteristics we were looking for, in fact, it had them to such a degree that a frequently heard cry in the midst of script conferences was: "Why didn't we have the sense to pick something simple like Achimides Principle!" This remark was prompted by more than just the usual frustration that accompanies the difficult task of analyzing any "soft" curriculum in terms of a specific set of behavioral objectives; the remark accurately reflected the fact that the Project had, indeed, chosen a particulary refractory and complex set of objectives to work with.

Unfortunately, neither the content specialist (who, it should be remembered is a professional geographer and teacher), nor the programers (who are skilled in the discipline of behavioral analysis) initially saw that the learning tasks implicit in the Project's "Working Paper #1" would not be do-able in three hours of instruction. In fact, even with the substantial reduction in content that occurred during the second year of the Project, a careful analysis of the results of our final in-school testing indicates that a further reduction in content or an increase in the amount of instruction time might still be required. In short, the content of the three videotaped lessons (two hours of instruction) that were finally produced by the Project represents only a small portion of the content that had been originally projected for six lessons (three hours of instruction).

The approach to specifying and delimiting that original content was deceptively simple; it was to ask a professional geographer (who specialized in human ecology) to describe what of his own skills and knowledge he would want to see learned by fifth or sixth graders during three hours of what he was asked to assume would be extremely effective audio-visual instruction.

The geographer to whom this question was put had been engaged as the content specialist by the Project and was given the task of developing a statement of the objectives he thought could reasonably be achieved in six half-hour lessons. This task was begun by a brief working session with the other staff members, at which a number of difficulties in stating these objectives in terms of the specific behaviors to be acquired by the students were identified. As a result, the curriculum outline ("Working Paper #1") developed by the content specialist did not go very far toward stating the objectives of the lessons in behavioral terms. This left a great deal of responsibility for carrying out a behavioral analysis of these objectives to the programers who had been given the tasks of outlining the lessons they were to program.

These early sessions were not attended by our television (i.e., audio-visual) specialist, although this third member of the "programing team" was present at many later meetings. In fact, his services became indispensible to the programers, who had previously programed only verbal material in book form, because now the task was to discover the problems and potential of programing in an audio-visual mode. One of the two programers found the transition from print to sound and pictures particularly easy to make. As the Project's audio-visual specialist put it: "He was able to hold back on the words and let the pictures do some of the talking".

However, the other programer (who had to deal with much more abstract material) found it almost impossible to refrain from using long printed presentations in place of pictures.

In order that the reader may understand the extreme narrowing down of content that took place during the course of the Project, he is asked to turn to Appendix E and to examine both the "Excerpts from Working Paper #1" and the "Overview" which it contains. The first portion of this material is an excerpt from the content specialists "Working Paper #1" which was completed in July 1964, soon after the start of the Project. The second portion is an "Overview" of the behavioral objectives of the original six half-hour lessons as they had been outlined and were programed in December of 1964. This "Overview" formed part of a report on the first six months of the Project.

It should be noted that in "Working Paper #1" the content specialist was responding to the questions: "What does a human ecologist do?" and, "In your opinion, what of the things he does, should we try to transmit to sixth graders via six video-taped lessons?"

The excerpt from the working paper does not answer these questions (or answers them only in part). The remainder of the paper (not included in Appendix E) contains typical case studies of the type we hoped the students would be able to conduct at the end of the six lessons.

As scripts were developed for the six lessons described in the "Overview" it gradually became apparent that in order to deal with the amount of material to be covered in each lesson, the programers were having to:

1. Take an extremely didactic approach to the material i.e., they were being forced into the familiar television syndrome of verbalizing about what was supposedly being learned as a convenient short cut through the teaching of important discriminations, procedures and skills that the student was going to be expected to perform at the end of the series.

This problem was dramatized when a comparision was made between a draft of the "final" test that was to be used to evaluate the series and the initial drafts of the scripts of the original lessons 1, 2, and 3 on "Population and Environment" "Technology" and "Social Organization". This comparison showed that the limited lesson time allotted to the programers had frequently driven them into a tactic of covering the necessary ground verbally by means of words on the screen or more often by turning certain sequences into little more than illustrated lectures interspersed with questions and answers.

The problem created by the fact that we had unwittingly allowed ourselves to attempt to teach far too much in six half-hour lessons brought about a crisis during the second half of the first year. At that point the Project was scheduled to last for just one year. This meant that either the six lessons under development were to be continued along unsatisfactory lines simply in order to finish the Project's obligation to produce and test programed television lessons, or, the instructional objectives of those lessons would have to be reduced and entirely new scripts developed. This, of course, was the only really acceptable alternative, but if it were taken, the chance of using any of the existing versions of the lessons that had been produced on videotape, or were being made ready for production as "base-line" versions of programs that could be improved through a process of trial and revision, would be lost completely. Furthermore, this alternative could not be taken unless the project were extended beyond its original one-year term.

After a review of the status of the Project by the Advisory Committee and staff members of the Dissemination Division at the U.S. Office of Education, it was decided that the Project would be extended. Therefore, during the last quarter of the first year of the Project, the staff began to pare down and restructure the content of the series so that fewer of the original instructional objectives might be taught in greater depth. Looking back on what we referred to earlier as the "box" we had worked ourselves into during the first year of the Project, it seems impossible that experienced instructional programers and experienced television specialists could have been so far wrong in their estimates of what could be taught in six televised lessons. Nevertheless, it did happen, and the reasons for its happening are many. However, the most obvious of these are:

1. The problem of an inadequate behavioral analysis in our not realizing the complexities of many of the behaviors we were trying to program and resulted in an overloading of each of the lessons. This situation is attributable to difficulty of the curriculum we had selected as well as to the fact that the techniques of behavioral analysis, in their present emerging state, are not too helpful when it comes to the type of "soft" curriculum objectives we had selected.

2. The fact that a thorough behavioral analysis takes a great deal of time, or at least more time than we had allowed ourselves. Therefore, the programers simply did the best analysis they could in the time they had to do it.

3. (And this, too, is related to time), the fact that we were very anxious to get something programed and on to video tape in order to learn as much as we could about the problems of marrying programed instruction (a method of individually-paced instruction) to television (a medium for conducting group-paced instruction). There is no question that this anxiety about and fascination with television caused us to hurry the

development of the content of the lessons in order to "see what things would look like on the tube".

NARROWING AND RESTRUCTURING THE CONTENT

The paring down and restructuring of the content of our series was done in two distinct stages. The first began during the last quarter of the first year and ended toward the close of the first quarter of the second year. During these six months the content of the series was pared down to a point where only about one half of the original objectives were to be attempted during the three hours of television instruction, which was still to be divided into six, one half-hour lessons. The second, and more drastic, stage of the paring down came after we had videotaped the "new" first lesson in our "new" series. A test of this lesson convinced us that despite the reduction of content, this lesson needed more time. As a result the content of our "new" first lesson soon became the content of a still newer first and second lesson. When we did divide this lesson into two separate lessons, the first lesson came to just under a half hour in length, but in allowing enough time during the second lesson for the learners to follow and chart the changes that had occurred in the population they had studied during the first lesson, the lesson ran between 40 and 45 minutes. On top of this we also discovered, as we drafted the script of the third lesson, that it too would have to be about the same length as the second. Altogether these three lessons would amount to approximately two hours of instruction, and would cover a fraction of the content described in "Working Paper #1", (see Appendix E).

In drafting these lessons it also became apparent that there were certain exercises that the learners needed to carry out which could not be done during the actual television lessons. These exercises would require supervision and help on the part of the classroom teacher. At about this time (the fourth month of the second year, October 1965) we met with the Project's Advisory Committee and two important decisions were made:

1. That the staff should produce the three lessons then in production as an integrated whole using the classroom teacher to follow-up each of the lessons (actually only Lessons 1 and 2 absolutely required follow-up; the teacher may follow up Lesson 3 in any number of ways).

2. The unused production resources of the Project should be reallocated for the purpose of creating a Filmed Report of the development of the final series of three lessons produced by the Project. The reason for this decision was that if the Project was, in fact, a successful demonstration project (which, in the eyes of the Advisory Committee, it was) it would have more impact if there were a Filmed Report containing excerpts from the series of lessons it had produced. This report

would be designed for viewing by educators who were concerned with the improvement of instructional television.

As a result of this meeting, and the recommendations of our three member Advisory Committee, the contract between Teachers College, Columbia University and the U.S. Office of Education was appropriately amended to allow for the production of a 45-minute Filmed Report in place of the third hour of programed television instruction. Therefore, in its final form, the series contains two hours of instruction in three lessons, instead of three hours of instruction in six lessons, but, these two hours of instruction contain approximately only one-fifth of the content planned for the original three hour, six lesson series (see Appendix E). Looked at another way, the three lessons described in the Filmed Report cover somewhat less than half of what had been the first lesson of the original six lesson series plus a portion of a "case study". A glance at the "Overview" in Appendix E will remind the reader that we had originally had planned three such case studies.

The modified case study in Lesson 3 of the final form of the series is a study which requires the students to develop a comparison between a primitive tribe of Australian Aborigines and a modern population such as their own. The "study" ends with a description of the attempts of the Australian Government to integrate these primitive people into the life of modern Australia.

The first two lessons of the final form of the series prepares the learner to study changes within a population and to compare different populations. The lessons do this by presenting the learner with a small hypothetical population of 18 people who all live in a small apartment house (see Appendix D - the back of the Worksheet for Lesson 1, page 1 for the drawing of this population used in the lesson) leading the learner to a point where he has described the makeup of that population from a number of different points of view. For instance, in Lesson 1 (see Appendix A) the learner looks at the population from the point of view of "work" and organizes its members into groups of "employed", "unemployed", "housewives" (who work, but are not paid), and "retired" (people who once worked, but have reached an age at which they no longer work). Having looked at this same population from some other "points of view" the lesson turns to the problem of how many "points of view" are needed to create what we have called "a good overall description of the population" (i.e., a view of the population from as many points of view as the students in each class think will be necessary to give a well-balanced picture of what the population is like). In order to allow the learners to carry out this exercise the first lesson leads each class up to a point where the children are ready to undertake the task as a class. At that point the lesson ends and the teacher guides the students through the rest of the exercise (see Appendix B).

In Lesson 2, the same population (the apartment house population) is used to study the changing nature of a population. At the end of this second lesson the learners are asked to identify changes in their own population of the types they have discovered in the hypothetical population they have been working with during the course of the lesson.

Generally stated, the behavior that the learners engage in during these lessons is an approximation of the decision-making process engaged in by human geographer or demographer as he organizes and classifies members of a population according to the information he decides he needs, and in the light of available information. By engaging in the identification and organization of data relevant to describing a population (and the changes that take place within it) the lessons attempt to build a set of skills and information within the learner that may be useful in studying other populations.

This final form of the series was developed during the last nine months of the Project. The development of its content had been a long and arduous experience. Even in its final form, we are convinced that the series still suffers from an inadequate behavioral analysis. However, we do feel we have managed to break some new ground by attempting to analyze and program objectives in the social studies curriculum of a type that neither programed instruction and television has not attempted in the past.

DEVELOPING "PROGRAMED" TELEVISION SCRIPTS

The problems that were implicit in our not having begun with an adequately detailed analysis of the behavioral objectives to be programed have already been described in some detail. But what has not been described and cannot really be fully dealt with here are the great difficulties that this inadequate analysis raised all through the process of script writing.

About the only script with which this was not a problem was the very first one to be developed. As has been mentioned earlier, this script was produced as a segment of our original lesson 1, and was designed to teach the discrimination between population and environment as well as the relativity that exists between these two concepts (i.e., if one is studying Population "A", Population "B" is part of the environment; whereas, if Population "B" is being studied, "A" is then part of its environment.) However, toward the end of the first year when we began attempting to teach the skills of observing a population and of developing an organized description of a small population based on limited data - and then, attempted to teach the learner to develop an overall description of a population given variety of relevant data we took on tne teaching of much more difficult objectives. These more difficult objectives were aimed at having the learner engage in tasks that are hopefully valid approximations of the tasks that a practicing of human geographer faces when he sits down to study a population. The word "hopefully" is used here to connote that we are not able to say with assurance that the tasks which the learners carry out during the course of the three lessons in this series do, in fact, represent true approximations of the more complex behavior of a practicing human geographer. In short, a lack of confidence in our analysis of the content of even the three lessons that eventually made up the series in its final form very often put us in the position of discovering things about what we were trying to teach only after we had begun developing the script. For instance, having begun with the best analysis of the objectives of which we were capable we would then attempt to decide on a specific set of responses we felt the learners ought to make within a given instructional sequence.

However, (and these things happened too frequently not to be painful) when we began to actually write a script we would discover that a particular reponse was going to take longer to develop than others, let us say, because of the time needed to present somewhat complicated sequential visual development. When this sort of thing happened it would necessitate the modifying, the cancelling or the moving to the next lesson of a sequence that we had planned, and saw as an integral part of the lesson being developed.

Another, and even more serious problem was that it was only when we actually had begun to create a programed sequence containing a particular set of responses that we would realize that these particular responses were irrelevant, or at best peripheral to the behavior we were really trying to program.

THE SCRIPT WRITING TEAM

As has been mentioned earlier, when the Project began we were under the impression that once the content for a lesson had been developed by the content specialist, that a programer who was skilled in behavioral analysis would be able to develop a programed audio-visual script, with the assistance of an audio-visual specialist whenever the programer felt he needed him. Although this strategy did work to some extent, it was not really productive nor was it the way we ended up writing the scripts for the three lessons that finally made up the series.

Now looking back, the idea of the programer simply using the audio-visual specialist more or less as a consultant in the script writing process probably never would have prevailed if the programing people on the Project had not been located in New York City while the audio-visual and television people were located in Washington. Even though there was generous allowances for travel between cities, somehow the feeling that taking an airplane trip just to ask some questions for two or three hours seemed extravagant.

Also, there was the difficulty of getting people's schedules to jibe. (During the first year everyone on the Project original staff was devoting only parttime to the Project.) Whatever the reasons, this type of divided script writing responsibility was not the way to develop the kind of programed material needed for this project.

The final series of scripts that were written and produced during the second year of the Project were developed by a two man team composed of a programer and an audio-visual-television specialist who worked closely together, either in Washington or New York - sometimes for two or three days of almost around-the-clock concentrated work. Occasionally a whole day was spent on one short sequence, or the problem of designing two or three visual displays. The time spent in such concentrated periods seemed, and it was, very important, but more important was the fact that the programer became more adept at working with the problems of creating audio-visual stimuli while the audio-visualist became much involved in solving problems of both pedagogy and content. In short, a very productive working relationship was developed.

The process of script writing:

We have already said that writing a programed television script (or the writing of any programed materials for that matter) begins, and, in a very real sense ends with the responses that are to be elicited from the learners.

In fact, one of the best ways to get an estimate of how long a particular lesson is apt to be would be to list the responses you plan to include in the lesson (or at least the key or criterion responses), and then estimate the time it would take a learner to make these responses. Then by estimating the time required to lead up to each response you will get some idea how far off you are in your estimate of how much you are going to be able to teach in a half-hour, forty-five minutes or however much time you have at your disposal. You can then cut back from there. This may seem like a very simple procedure - and one that would be hit upon very early by people engaged in programing in a time controlled medium such as group-paced television. Actually it is not as simple a procedure to implement as it sounds, and it was hit upon so late in work of this project that it could hardly be much help. At any rate, when responses have been identified and the sequences in which they are to appear have been outlined or at least thoroughly thought through, the unique aspect of writing a program television script begins. This aspect is the task of designing sets or sequences of audio-visual stimuli that will lead the learner to make appropriate and relevant responses. This has been referred to as the unique aspect of programing instruction for television because most programing that has been developed for school use has utilized almost purely verbal stimuli. This means that the idea of "letting the picture say it" (or more often, "let the camere motion make the picture say it") is an all but impossible thing to accomplish to any sophisticated degree with printed programed materials.

The uniqueness then lies in the visual resources at the command of the programer, but the experience of having these resources proved to be so unique (or at least so different) that it was very difficult to learn to use them. More precisely, the difficulty was in being able to imagine, while writing a script, what a particular visual display was going to look like when it finally got on the television screen. Furthermore, it was well nigh impossible to anticipate the effect that certain visuals would have on the learners. In some cases even seemingly "sure fire" easy to "read" visual configurations would be very confusing when they were tested with youngsters.

One technique that was used during the development of a script to overcome this problem was to read sections of a script to individual youngsters and then show them sketches of the visuals that were being contemplated as part of the sequence.This sounds as though it ought to work fairly well, but actually because so many of the visuals used during the lessons had the learner's attention directed to particular portions of the visual field by means of camera movements, this type of "story board" tryout never did work out very well as a suitable "developmental testing" technique.

In short, the writers of the scripts for these series found it very difficult to empirically shape their efforts prior to the time the script was produced in some form (no matter how crude) for student viewing via television. Likewise they found very little guidance in the research literature that would help them answer questions without this empirical shaping and re-shaping via student test. Yet getting a script to a point where it could be put onto a television screen (even in an unpolished state) was a costly process. There is, of course, a great difference between developing printed programed material and something that is to be presented audio-visually. The printed programed is simply typed out and presented to a student in a form that reasonably approximates the final form of the program. However, the type of script that had to be developed for this project (see Appendix A) is really meaningless until it is actually seen as a picture and sound presentation. Therefore, the script writing process became more and more of an art rather than less as the writers got into it. It seems to us that it must remain in this state until research in the audio-visual field begins to produce less ambiguous results - results that give real guidance in the making of the pressing practical questions that confront the writer of programed television scripts.

PRODUCTION

PRODUCING THE SCRIPT

In general, we found there is little unambiguous research that could guide our efforts in either the specification or securing of visuals suitable for television presentation to fifth or sixth graders. However, recent research, which has indicated a basic interference when both a talking face and some other visual element were on screen at the same time, did cause us to reject the talking face on camera as a useful visual element. This being the case, we were faced with the self-imposed task of finding appropriate visuals for every line of the script to substitute in part for the removal of the face on camera.

Our yardsticks for choosing between various different forms of presenting a visual element are set out more fully below; but suffice it to say at this point that the implications of the above mentioned research and the earlier research of May and Lumsdaine led us to the conclusion that motion (either in a film, or by a camera moving around a visual), and reality (a photograph as opposed to a line drawing) were not intrinsically "better" and might be not as suitable because of the interference provided by the motion itself or by the extraneous elements in a photograph. In addition, drawings can be manipulated and controlled more easily than "reality" photographs. We, therefore, started out to make maximum use of drawings and restrict the use of photographs and film to those "frames" where such characteristics added to the instructional impact.

Because we had rejected the use of the teacher's face on screen (the traditional "safety" shot used whenever there is nothing else to show) the selection of visuals for each lesson took on added importance. This also presented the major problem of how to get from one visual element to another without an unwieldy number of camera cards and constant camera changes which involve monumental lighting, framing and alignment problems. A third problem arose with the decision to use printed captions on the screen to give information and ask questions, portions of which would appear or disappear as required by the script. Sufficiently precise alignment of slides in a film chain is simply not possible as anyone who has tried it knows. At first we made extensive use of pull cards but later developed and then refined a two-stage animation devise which we dubbed somewhat inaccurately the "Animator." This gave us both an inexpensive way to get visuals presented to the camera and sufficient control to achieve nearly perfect superimposition of the two stages. Additionally, it allowed us to present a continuous flow of visuals to a single studio, camera.

For those moments when the voice directed the learners to read a question on their worksheet; or, when otherwise we wanted them to listen carefully to what was being said, the screen would simply go blank, early in the Project to "black", later to "white".

The amount of research available with regard to the type of voice to use was even skimpier than that for video. However, we felt that because the person was not going to be seen, his voice should have more character and personality than the impersonal objective voice of a typical television or radio announcer.

As a result we tried six different voices -- and combinations of voices -- before we settled on a seventh voice: a professional actor. His voice was used throughout the final versions of the lessons.

PREPARATION OF VISUALS

The critical stage in the preparation of visuals actually came during the writing of a script. The greater the specification there, the easier the job of finding or preparing each visual. However, because this subject matter was so different from most subjects attempted by audio-visual instruction, nearly all visuals were developed from scratch.

Very early in the Project the decision was made to use film only when the motion would add to the instruction. This was based in part on some early research by Lumsdaine and May who demonstrated that learners learned as well from a pencil story-board as they do from a full color film. Other studies also indicate that there is a kind of fascination with motion that acts as interference if the motion is not relevant to what is being talked about. That is, if you are talking about how a locomotive operates, motion may be very important to the instruction; if, on the other hand, you are just referring to various forms of transportation, a still picture of a locomotive is probably sufficient, and there is no unnecessary interference from irrelevant motion.

To be sure there were times when film was clearly called for; and, if so, we either turned to sources of stock footage such as governmental departments and agencies or to the many representatives of industry who have offices in the Washington, D.C., area. If none of them had the film we wanted we shot it ourselves. This worked out very well when the subject was something we could shoot. Otherwise, such as when film was needed in some of the early versions of Lessons 1, 2, or 3, and it was not the kind of film we could get ourselves, we were often somewhat disappointed at the caliber of film available. This, too, contributed to our feeling not to use film unless we felt it was clearly important to do so.

Similarly, the difficulty in finding a photograph that showed what needed to be shown without interference from other elements in the scene, plus the fact that we did not feel that having a real photograph necessarily contributed to the learning, led us to use photographs only when reality was called for specifically.

A third point here is that in a sequence or series of visuals, such as a parade of forms of transportation noted above, we tried to get parallel visual forms; that is, all film, all photos, or all drawings to give the visual feeling of equality. Whatever form we chose we tried to get approximately the same type of shot: equally closeup, equivalent angle, etc.

From earlier research, and very quickly from our own experience, we realized that when we were making a general statement or stating some conclusion, the use of any representational visual at all was interference in the system as it tended to particularize for the learner his understanding of the conclusion and limit his future application of it. We, therefore, turned to printed captions in such cases.

Thus we had to invent a system by which we could bring a large number of drawings (or the same drawing a large number of times, differing perhaps in emphasis or highlights each time) and a large number of captions to the camera with a degree of registration and control never used in TV before. Our efforts led to the construction of a device which used standard 8" x 10" overhead projector slides. This device was designed specifically for this project and was troubled from the start with design problems since the optical engineers had no previous model to work from. However, with substantial effort it could be sufficiently well aligned so that it was acceptable for the preliminary stages of production.

At a later stage in the Project, the number of problems associated with this device increased geometrically without being able to achieve a high quality picture. As a result we approached the Buhl Optical Company with our problem. Their response was excellent. Within a few days of our original presentation of the problem, they came up with a method of combining two standard overhead projector units with a specifically designed and manufactured mount that was capable of virtually perfect superimposition on a rear projection screen a few feet away. Because of the nature of the Project and their desire to contribute to it, the cost to the Project was the materials alone and they absorbed all design and testing costs. The filmed report of this project includes a demonstration of this device. Basically there are three ways to use the device effectively: first, simply as an overhead projector (light on one stage only); second, as a dual overhead projector (whose images were superimposed) we could, by alternating between stages and changing cells when a stage was not on, present very simple animated steps in drawing, vary the backgrounds and keep the object the same, or add words or underline words; or third, by having both stages on at once but the light on one (controlled by a rheostat) turned low, we could, by fading the low stage up and other stage down, make words or pictoral elements "fade" in. During this project we made extensive use of the latter two capabilities for adding words and "cueing" answers. (See Matthew Israel's research on fade-in cueing.) In addition to being useful in this project, this device has already been used in several other projects at WETA. Functionally, the animator could also be used to "super" or "key" numbers or words over pictoral elements from other sources.

SCRIPT ANALYSIS

Once we had developed the "animator" as the primary source of presenting drawings and captions, there remained the task of analyzing the script word by word and specifying which source (film, slide, animator, camera card) could be used most effectively to present each element.

Using the standard procedure of developing "prop" lists for each element, all visuals of a particular type were put on a single sheet, and, if film or photograph, a potential source or series of potential sources was added after each item to aid in the research. For work that was to be done by an artist, a separate sheet was prepared for each visual or series of visuals, and precise size limits, placement, and materials to be used were indicated. In some cases, when words were to be superimposed over photographs yet to be secured, and placement of these words depended on the position of elements in the photograph, these art orders were withheld until the photo had been secured and proper placement could be ascertained.

Next came the step of gathering the visuals. The order in which they were to be sought often was a vital factor since the "lead-time" required for finding, ordering, printing, photographing, and preparing each item varied greatly. The first step was usually to submit the captions and drawings to the artist to allow him ample time to complete his part of the job. If film was called for, it was frequently sought first since film sequences required the longest preparation time. Usually after a sequence had been located, it would take a week or more to secure a print; then, together with film from other sources, the sequence had to be edited. If some sequences were not available from the existing resources we would arrange to have the film shot, if possible. In general we found that film we shot ourselves to our own specifications was of better quality and better designed for our purposes. However, often it was not possible to shoot it and a compromise was made. For filming purposes, the Project utilized a Bolex equipped with zoom lens for silent shooting and an Arriflex with zoom for sound-on-film shooting.

Next came the research for still photographs. Again they often required time to locate and process. In addition the requirements for specificity were frequently greater than for film segments. To illustrate: a photograph might have to "say" a very different population in three seconds on screen; therefore, it would have to be sufficiently close up, sufficiently clear and free from interference to communicate clearly at a glance. In general, the shorter the length of time a visual was to be on screen, the more rigorous the specifications. Often, in terms of hours of research, more time was spent on three seconds than on ten minutes of script time.

Again, if appropriate photographs were not available, we would, when possible, shoot them ourselves. We had available to the Project staff a number of 35 mm cameras, as well as a Polaroid Land Camera.

PRE-PRODUCTION PREPARATION

Once all the film had been acquired, there remained the editing process. For sections of the script involving long sequence of film we used two distinct techniques for editing. The first way was used if the film required a certain length of time to tell its own story -- such as a diver diving into a pool or a man completing some activity. In this case we would edit the film and then record the voice to match the film. Thus the audio portion might have pauses of varying length to allow the film to unfold at its own pace. At other times the audio portion was carrying the burden of the instruction and the film was used primarily to illustrate and support the audio. In this case we would pre-record that portion of the audio used in the film sequence and edit the film to it. In either case each separate segement of film was spliced onto a single reel for ease of handling and each section preceded by an Academy Leader and cue marked.

We also found it necessary to treat photographs in two ways: if the photograph was merely illustrative and it carried no specific instructional burden we would have it made into a standard 2 x 2 glass slide and put in the film chain; if, on the other hand, the script required that the camera stay on a photograph for any length of time or we needed to highlight something in order to direct the learner's attention, it was mounted on a card in front of a camera with a zoom lens.

Certain drawings in early verions of the script were done on opaque camera cards because we combined movement on the cards with "arrows" and "words" from other sources. In the later versions of the lessons, including our last versions nearly all drawings were ink on tracing paper which we would then use to produce a series of cells for our animator. For rehearsal and developmental purposes all captions were done by speedball pen on tracing paper and then by subtraction of indicated elements, a series of cells was produced, which when arranged in the opposite order of production, created a buildup. To illustrate: (See series of animated cells on the following page).

Thus, from one piece of artwork 8 cells are created which when programed to be shown in the order #8, #7, #6, #5, #4, #3, #1 and then a question asked followed by #2, we have a complete caption series.

The method used for converting the captions on tracing paper to cells for the animator was the standard audio-visual process of diazo printing. This was done in part to demonstrate that a low cost process which is readily available in many school systems and television stations is capable of achieving the type of results we

Births } can change: Deaths }--size and Moves } makeup Aging }--only size? Learning} only makeup? 1. Original artwork	Births } can change: Deaths }--size and Moves } makeup Aging }-- Learning} only makeup 2. Feedback	Births } can change: Deaths }--size and Moves } makeup Aging }--only size? Learning} 3. All but last line
Births } can change: Deaths }--size and Moves } makeup Aging } Learning} 4. 2 lines gone	Births } can change: Deaths }--size and Moves } makeup Aging Learning 5. Eliminate lower brackets	Births } Deaths }--can change: Moves } Aging Learning 6. More words gone
Births } Deaths } Moves } Aging Learning 7. Eliminate "change"	Births Deaths Moves Aging Learning 8. Eliminate brackets	

required. Photography would have given a clearer, more polished product but the cost would have been prohibitive in view of the great numbers of script changes between original writing and final production; and this cost factor might discourage others from trying to achieve the same or better results.

A simple line drawing of an "apartment house" with a population of 18 people that is used extensively in the first two lessons was originally done on a white card, then reduced to an 8 x 10 photographic transparency, which, in turn, became our "master" cell for the diazo printing process. Then a series of cells were prepared; and through the use of acetate ink and the addition of words either in the printing process or on the individual cell itself, various people could be emphasized or highlighted and various captions presented while the basic visual remained the same.

When all of the visuals were gathered and produced they were collated and checked against the script and keyed to scene numbers. Then the visuals were allocated to the various cameras and separately stacked. If any further on camera pre-testing was necessary, it was done prior to rehearsal.

Paralleling this preparation of visuals was the mimeographing of the script so that each technician and all project people could have their own copy. In the case of cameramen, and in the case of the video and audio engineers, all special effects and quick changes were indicated.

7

A word is needed at this point with regard to our experimentation with 2 voices in productions of the earlier versions of the lessons. Basically, the rationale came from our elimination of the on-camera teacher and our fear that a voice alone (not associated with any person) might become rather boring and tedious over a long period. It was felt that one voice could be used during the periods of presentation and exposition, while another voice could ask the questions and give the feedback or confirmation. This had the additional benefit of alerting the learner that a question they were expected to answer was being asked. This seemed to be working well and was actually used in programs 1"D" and 1"E" which were tested on a class at the studio. However, when the decision was made to have types of overt responses other than written responses (hand-raising and answer-aloud in 1"F" and 1"G", only answer-aloud in 1"H"), two voices became unworkable. In the end we decided that what we wanted to stress was the possibility that a question required some sort of overt response could be asked at any time during a lesson and that therefore the learner should pay equal attention to all questions whether they required written responses, or not.

As soon as a printed script was available it was given to the person who was to deliver it as announcer. For the first few productions this person (or persons, when two voices were used) was a member of the Project Staff who had been involved in the writing of the script. It was, therefore, not necessary to spend much time going through the script word by word and sequence by sequence. However, later on in the Project an outside person was brought in to act as announcer. In this case substantial time had to be spent working on emphasis, phrasing, and pacing. During one session we tried a female voice but the staff agreed that a male voice would be better. In the later stages of the Project we were fortunate to discover a person who, as a professional actor, adapted easily to the highly specialized emphasis and pacing requirements of the role, and who, as a member of the staff at the Institute of Educational Technology, had sufficient time and interest to become thoroughly involved in converting the written script into a well-balanced spoken one.

In any case, after consultation with the television director on all of the above, we were ready for rehearsal.

REHEARSALS

In the way of physical facilities WETA provided the Project with three 4-1/2" Marconi Image Orthicon studio cameras on pedestals -- 2 equipped with zoom lenses and the third with a standard complement of lenses (2", 3", 5", 8", or 12"). In the control room was a switcher and a special effects generator capable of horizontal and vertical wipes, corner inserts, keying and matting. The audio booth was immediately next to the control room and commanded a view of much of the studio. Downstairs in the master control room area, in addition to the camera control equipment there were two film chains each with 2 Kodak 16 mm projectors and two 32 slide cartridges.

Rehearsals of most television programs are usually devoted to working out all the details of the individual cameraman's assignments and to a practice of his movements and shots and to working on the timing of the material to be presented. While this was true of the rehearsals in this project, our rehearsals also served the very important function of allowing the content and programing specialists, whose previous experience had been with written material, to see and hear their material on television. Additionally because of the very "soft" nature of the content of the series, this was a chance to reorganize and restructure the script both with an eye to the effect of the visual stimuli and an ear to the effect of the oral delivery.

During several of the rehearsal periods over the life of the Project we reversed the polarity of one of the cameras so that with a magic marker and a stack of white cards we could instantly create alternative captions and replace old ones or add new ones. Similarly many times photographs that would ultimately end up in the film chain for a production were brought into the studio mounted on camera cards so that we could check framing and explore the need for movement to direct the learners' attention to some particular part of the scene.

Thus, because so many of the visuals were not in the form (nor from the source) that they would be in for the production, the camera assignments were of little importance and the principal effort was on script revision.

In our third trial of lesson I we discovered that the two column television script (Video-Audio columns) was inadequate to clearly show the relationship between visual elements, captions or question numbers and the audio portion of the script. We, therefore, invented a third "Key" column to show this relationship. (See Appendix A.)

At first there were some problems getting the studio director to work with this "strange" script, but because it was so helpful to the other members of the project staff, the director quickly adapted to it. Over the rest of the life of the Project it proved to be most helpful.

Perhaps the most difficult item during our rehearsal periods was coming to grips in fairly rigorous fashion with the idea that every switch from one camera to another and every movement of the camera was for a definite purpose. This idea is, of course, not new to television, but the degree to which we specified timing, rate of movement and exact starting and stopping frames was. This rigor was necessary because every movement had to be meaningful and, often, because the placement of a caption from another camera source depended on the position of the ending frame. For instance in an early version of lesson 2 the camera moved from a full shot of a small town on a mural to a close-up of some houses on the edge of the town. The frame was very tight in that a car full of people very close to the houses had to be eliminated from the lower portion of the frame and a tractor in a field had to be excluded from the left edge of the frame. Furthermore, the houses had to be placed so that the word "houses" could be superimposed from another source right over the houses themselves. In addition, the word "houses" had to be faded in on an audio cue, at just the correct rate of speed, and all camera movement had to have been completed before the word could be faded in.

In the early stages of the project we decided to use a recorded voice for the rehearsal periods. This was based on the need for precise timing of visuals to the audio track and the need to hold one or the other constant. In addition, because we were not using a professional announcer we felt that the interruptions and confusion as well as the constant directions flowing from the director to the technicians would break the concentration of our "teacher". However, we soon discovered that we needed more flexibility at the rehearsal stage. The script that had received much attention as a written script was now being spoken. As a result, sentences had to be restructured, words repeated after pauses, and in some cases, whole sections of script rewritten to match the reordering of movement or rearrangement of the elements in a visual. With a live announcer we could incorporate these changes instantly. Furthermore, the person who we finally selected as "teacher", had had extensive stage experience and adapted remarkably well to the confusion of the television process.

Throughout the life of the Project we were constantly aware of "pushing" the capability of the television medium, both in terms of the precise coordination demanded of the personnel involved but also in terms of the combinations of sources to be mixed and the method of mixing them. At one point when we were trying to accomplish a particular effect the television director made the following remarks:

"It's impossible" (Well, set it up and let's try it anyway).

"It's unorthodox" (I never heard of this before).

"I'll be damned, it works."

Then having accomplished the effect the director capped his remarks with: "How do I write it down?"

While individually many of the effects were within the "normal" range, the combinations we used and the persistence with which we sought new combinations provided a constant challenge to the television crew.

A final note on rehearsals: initially we incorporated the rehearsals into a full day in the studio - rehearsing in the morning and videotaping in the afternoon. During this phase we had the visuals in their final form. However, as discussed above, we found we needed more flexibility and we started the process of separating rehearsals from the taping sessions. At first the separation was only a matter of a few days, but toward the end of the project this separation evolved into a full week or more.

In general the process evolved to the following:

(1) First rehearsal: heavy emphasis here on content and script development; picture visuals on cards; captions hand-lettered on cards; about 4 hours in length 2 weeks in advance of taping date; live announcer; try to get through script either completely twice or once with second rehearsals of difficult sections.

(2) Second rehearsal: less emphasis on content development; still live announcer for script changes; visuals and captions

in final form; attention equally divided between script revisions and precise camera assignments and movements; about a week before taping.

Once the final script was typed we would go through the script with the television director and we were ready for a production.

STUDIO PRODUCTION

In addition to the studio facilities described above, our tapings were done on Ampex Model 1200 Videotape Recorders. These machines were equipped with electronic editors. In addition several members of the WETA Engineering Staff were adept at mechanical editing. Both of these latter capabilities were of great value to the Project.

Although we tried both live audio and pre-taped audio from time to time, we were able by the end of the Project (due to the ability of our announcer) to use live audio for the taping sessions. While this presented a potential difficulty in terms of timing and emphasis on particular words or phrases, the announcer overcame the problems. Not once over the final taping sessions was a portion of a program done over solely because of his error. A portion of Lesson 3 was pre-recorded because it called for very extensive use of film segments which had to be edited and timed prior to entering the studio.

While it goes without saying that all visuals were in their final form for a production period, it is interesting to note that in some of the early versions of the three lessons we used hand-lettered captions instead of printed ones even in the tape production. This was based in part on a showing of some of the research that learners could do just as well with rough-cut hand lettering as they could with print. And, since we had been using hand-lettering in rehearsals we found there was some savings if we used the same in production. However, as the Project continued we gradually shifted over to using "Prestype" press-on lettering and the Diazo printing process for essentially two reasons. The first reason was economy: the art staff indicated that they could actually deliver any given piece of artwork in less time using Prestype than if they hand-lettered it. Since it was artist time, not materials, that represented the major cost of these types of visuals, we decided to switch. Since, too, the research indicated no difference in educational value, we were happy to use the Prestype to give our production a more polished appearance. The second reason for switching to Prestype is related to the problems we had coming up with a final script. Despite our best efforts to avoid it, we were frequently in the position of making a few last minute changes in the script, some of which called for rewording of some visuals and other changes. These changes would run as late as the night before a production and since none of us could match the hand-lettering done earlier by the artist, we would have been stuck. However, after the switch to Prestype, which nearly anyone can apply, we were able to get the new visuals ready, either by rearranging words of existing work or by preparing new art work. In any case, the final product looked better when printed.

During all production periods we arranged for standby use of the artist for the entire period. On the occasions that we did need him, he was able, on this basis, to give us new artwork on very short notice, usually within a half hour, and our production was not lost.

The slides and film segments were timed and numbered; visuals for the animator numbered and camera cards numbered. These numbers were then put on the director's and producer's scripts for fast coordination. The cameramen's scripts were keyed to their own shots and moves and the Audio operator's script keyed to changes in the audio source.

Having seen some parts of any given lesson twice before in rehearsals and usually most parts of a lesson at least once before, we usually did not begin a production period by rehearsing the whole lesson. Instead we would, if necessary at all, rehearse short segments and then record that part on video tape. Then we would go on to the next segment, etc. These segments would be joined by means of the electronic editing capability of the recorders. During the life of the Project we made extensive use of this capability, at times planning and executing more than 20 edits in a half-hour production. In the final version of lesson 3, we were forced because of technical problems to do some segments out of order, thus relying on the mechanical editing capability of the engineering staff as well.

WHY VIDEOTAPE?

At this point it is important to set forth the rationale for the use of videotape and the television production process as opposed to the film process.

From the beginning this project was experimental in character. The staff was attempting to bring vastly increased rigor to the planning and presentation of a series of instructional television lessons by the introduction of some of the principles of programing. There were no models. But more important than this, there were no people who were both qualified as programers and as television producers. Thus the project called for the blending of the skills of a content specialist and a programing specialist on the one hand with the skills of an instructional television producer on the other. Yet the content and programing specialists were used to working in the print medium and had had almost no experience in television. It was clear, therefore, that if they were to effectively specify single visuals and sequential visual presentations, they could do this better, and, at the same time, become more familiar with the characteristics of television presentation more rapidly, if they could see what they had specified as it was being done. With the film process the framing of a particular visual must be checked through the viewfinder of the camera itself - and by one person at a time. Furthermore all scenes must be judged individually with no chance to see them together as a sequence. Finally if captions were to be superimposed over another visual it requires 2 or sometimes 3 separate film shots and the positioning and size of the caption is by estimate, with the final positioning not seen until both rolls of film are processed then a composite made. This would, of course, be expensive and take time.

On the other hand, consider videotape. Through the television process all people could, by viewing a monitor, see exactly what the cameraman was seeing. They could consult as a team and direct movements as a team. A series of visuals could be viewed as a sequence so that balance could be achieved. Captions could be superimposed and moved around quickly and easily. Finally, through the use of videotape there is immediate playback.

These factors, plus the belief on the part of the project director that videotape would become less expensive and more readily available in the future, were the factors that caused the project staff to decide on the use of videotape at the beginning of the Project. As the Project continued, these factors became very important, indeed. Time, especially the time after a script was written to when it could be seen on a television set, was very critical. Things were frequently spotted in rehearsal that could quickly and easily be changed. The whole process of script revision based on rehearsals was to become essential to the development of the lessons. Close coordination and thorough rehearsing made camera movements and timing very close to that attainable through film.

In general the flexibility and immediacy of the videotape process far outweighed any possible disadvantages during this development stage. In terms of "per hour" costs, videotape is of course more expensive. Yet through careful pre-production preparation, actual studio time was minimal, and the time between completion of the script and a viewing of the program was also minimal.

SUMMARY OF PRODUCTION PROCEDURES

The procedures or steps that have been evolved during this project for the development of programed videotaped lessons have emerged from a process of trial and error.

These procedures, taken in order are:

1. Developing of a statement of objectives.
2. Designing a pre and posttest.
3. Outlining the sequence of the lesson.
4. Testing groups of 6th graders to see if they possess the prerequisite knowledge assumed by the lesson.
5. Drafting the script and developing the visuals for the lesson.
6. Testing the script (by reading the audio script and describing the accompanying visuals) on a small number of 6th grade students individually.
7. Revising the script and "locking it up" for its first videotaped version of the lesson.
8. Recording the audio for the lesson.
9. Creating and locating the visuals specified by the script.
10. Producing the videotaped lesson.
11. Student testing of lesson (including pre and posttesting).
12. Analyzing the data and evaluating the performance of the lesson.
13. Revising the lesson.
14. Redesigning and reproducing the lesson until criterion performance is reached or reasonably approximated in the light of time and money limitations.

TESTING AND REVISING

TEST POPULATION

As mentioned earlier, the content of this series was generally within the curriculum area of the 5th or 6th grades. As a result of this, the vocabulary and concepts to be used were aimed at this level and pretested in various schools in both the New York and Washington areas. Because our testing showed that what we wanted to teach was generally appropriate for this level from both points of view (curriculum, difficulty of vocabulary), all other decisions we had to make with regard to pacing and rate of content development were geared to what little we do know about verbal skills at this level.

Our test population was the 17 school districts served by WETA-TV in Washington, D. C. including over 600 elementary schools. These districts generally include all of the suburban areas surrounding Washington itself, but also extend to some rural areas and include the parochial schools within Washington as well. Nearly every conceivable socio-economic-ethnic grouping possible is to be found within these schools.

While we were not fully aware of the significance of our selection of specific students for our early testing, we decided to use selected students whose IQ scores were within the 90-120 range. While this is slightly above normal, we felt that they would be able to give us relatively sophisticated feedback from our early testing that would greatly aid us in our revision process. When testing a printed program this same technique is often used. However, what we did not fully realize until well into the project was that these better classes had become our target population because we had been making revisions keyed to these higher level learners.

EARLY STUDIO TESTING

Lack of unambiguous research findings on which to base decisions about how to construct and present audiovisual stimuli made it necessary to depend heavily on the empirical testing of our material. For instance, because the structure and form of our lessons were so different from any other television lesson, we had no idea how long the programs could be expected to hold the learner's attention. While some research has established that active participation on the part of the learner holds his attention much better and will usually produce better learning, this does not necessarily mean the program can be longer than the usual 20-30 minute television lesson. As a matter of fact, we found that virtually no one among the students or teachers who saw our final programs complained that they were too long even though two of the programs were over 40 minutes - twice the length "recommended" by the WETA School Television Service.

In addition very little research was available to aid us in finding that combination of content development and pacing that would be most effective. Therefore, finding this combination empirically became an important purpose of the early testing.

Because few television programs have asked for overt responses, waited for each response to be made, and given immediate confirmation, we had no way of knowing how much to prompt for a particular response or how much time to allow for such responding overall. In the first few versions of Lesson 1, one voice was used to give the expository material and a second voice used to ask a question requiring a response. As outlined earlier, this worked very well until we made the decision to use other types of overt responses such as answering aloud and hand raising in addition to the written responses. When we decided to use these other forms of response, we also decided to limit those answers that were to be written to those that when all filled in correctly would leave the students with a good set of notes - that is, usually, the more important general responses were written while less important answers were answered some other way. By using all three modes of response we found we could ask more questions, virtually presenting all material in an "inquiry" mode, sustain attention better and save time by requiring only one word verbal answers to some questions. But until these early tests, we were not sure if the learners would respond to a television set asking them to raise their hands.

Finally, we wanted to use these early tests to observe and study the individual and group reactions to the five new elements we added to conventional instructional television.

First, were written captions helpful or insulting or merely confusing? Second, how did the learners react to being asked to respond and then having to respond? Third, what was the effect on the learners of removing the teacher from the screen or how personal a relationship could they build up with a disembodied voice? Fourth, what was their reaction when the screen went blank for a second, for several seconds, for even longer periods of time? And, fifth, what, if any social reinforcement was there in having the television telling a learner he had the right answer if his answer was (a) written, (b) hand raising, or (c) verbal? Before these early tests we had only notions; after the tests we were beginning to know a little more about how to answer these questions. However, what we learned was frequently on the intuitive level.

PROCEDURES OF STUDIO TESTING

At first we brought small groups of from six to ten students to the studio. They were all in the 90-120 IQ range. The students were not told they were to be tested. Only after they had arrived were they told that they would help us evaluate a program to help us make a better one. In order to learn what the learners already knew about the content material we pretested them but did not tell them there would also be a test after the program. They were also given worksheets and told that the worksheets would not be graded. They then took the lesson and then were given the posttest. All through the lesson they were observed from a relatively covert spot in the control room by staff members. Following the posttest we spent substantial time talking over the lesson with both the students and teachers. Later we gathered and evaluated worksheets and pre and posttests. With such a small group it was not difficult to correlate posttest performance with the worksheet and remember how that learner reacted at various points in the program.

Admittedly, these were select students in a highly motivated situation, and thus that there was a very strong "Hawthorne" effect, yet our early tests showed that the first version of our lesson, established as it was largely on guesswork and intuition was able to do some teaching. Even though the results were better than we would have expected even from these same learners under more normal conditions we still felt that the pre and posttest data and the discussions we had with the learners reflected the fact that there had been substantial learning.

SOME ASPECTS OF THE REVISION PROCESS

While we were satisfied that our first version had been able to do some teaching, following the early small-group testing, we began the process of revision based on student feedback that is so familiar to the programming process.

Structurally we found that by increasing active participation on the part of the learners we could increase the length of the program without the drop-off of interest that would accompany such a change in the length of conventional instructional television.

At the suggestion of the advisory committee we revised the beginning of lesson one and started it with a sequence designed to acclimate students to techniques of responding. This, it was felt, would make the program a "game" in which the students would try to "beat" the TV. However, as a result, the subject material that had been in lesson one was now partly in one and partly in lesson two. Later we were to find empirically that all the instructions were superfluous and that the learners were quick to pick up the challenge of the game without them.

As noted in the previous section we did find in our early testing that answering aloud and by raising one's hand was fully as effective as an attention holder, and had the advantage of taking much less time that written answers. We, therefore, began to design the later versions to include all three types of response. The research of Cummings and Goldstein on overt and covert responses provided the lead here. As a consequence of this change we made the decision to drop the second (questioning) voice and to put nearly all material in inquiry form. Thus, our hope was that the learner, instead of having heavy prompting for a few questions, would now have to be prepared to answer many more questions that could come at any time.

Because we found that our early test subjects all found our combination of film, slides, drawings understandable, we decided to continue their use pretty much as they were used in the first program. Designing "cartoon" type line drawings that would be acceptable to fifth or sixth graders was very difficult.

While some of the learners noticed that there had been no teacher on the screen, many of them did not notice it until it was pointed out to them. One boy in a group that we had in the studio at a later stage was so sure that there had been a teacher on the screen that he was even beginning to describe him. In other words, while we had removed the person of the teacher, we had not removed the personality. The learners were not disturbed at not seeing the teacher, but as one boy put it, "You didn't show us a teacher because you were showing us more of what we are supposed to be learning about." In later versions there was further experimentation with the voice of the teacher, but our goal remained the same, to attempt to keep this personal relationship.

As for the five elements identified in the previous section, we found that the students thought that the written captions were helpful; they enjoyed the "game" of being asked questions and having to respond; and, as noted above, they were not bothered by not having a teacher on screen; and, we observed a very high degree of social reinforcement in getting the right answer before the television confirmed it. The one new "element" that seemed to bother the students the most was the "blank" screen. If the screen went dark some of the students volunteered to their own teacher that something was wrong with the TV. However, as we were later to decide, when the screen went to "white" the students were not puzzled and merely continued to watch in anticipation of something happening. We, therefore, determined that we could eliminate the possible interference by using a "white" screen in these situations.

One further note about the responses. We developed a rule, which we were eventually to forget ourselves to our own dismay, that the first response in a program ought to be a written one. This would tend to establish this as the "standard" response made that the learners should expect until and unless a contrary direction was given. In our final version of Lesson 1, probably due to the extent of last minute script revisions in attempting to keep the length of the program under 30 minutes, we forgot this self-imposed rule and the first response as an "answer aloud." This, as we had thought it would, set up the behavior that a response was to be aloud unless a contrary instruction were given. As it developed, the students very quickly learned to wait for the instruction before responding, but had we followed our own rule, we would have avoided the confusion altogether.

THE REVISED ROLE OF THE CLASSROOM TEACHER

It had been our original hope to design this series of lessons to be independent of specified activity on the part of the classroom teacher. That is, to develop as "self-contained" a series as possible. However, two factors caused us to change our mind and develop an active supporting role for the classroom teacher. The first is the factor about which much is said but about which little is ever done: the feeling on the part of the classroom teacher that instructional TV is a competitive rather than a complementary teaching device. Whether this feeling is based on a competition for loyalty, a challenge to authority, or simply as a loss of complete curriculum control is of little significance for our purposes. The fact remains that by far a majority of classroom teachers feel this competition for one reason or another and react with varying degrees of hostility to such material. We, therefore, consciously tried by developing a teacher's guide (see Appendix B) to give the teacher motivation and desire to use the material and to give the teacher a measure of the control of the supplemental material and procedures to be followed in solving the problems presented by the lessons.

The second factor that changed our thinking about the role of the teacher was related to the content generally and specifically the content after our shift to the dynamic aspects of populations and to developing specific behavior in the learners. We were attempting to develop the behavior of a census taker. Rather than tell the learners what a census taker does, we wanted them to deal with some of the problems of conducting a census. Thus, at the end of Lesson 2 they were to study the changes and causes of changes in their own community. Clearly this was the kind of assignment that we could not adequately handle within the program; but one that would depend to a large extent on the participation and direction given by the classroom teacher in adapting the principles and concepts of the lessons to the local situation.

As a result of the above we developed the Guide to Teachers as a way of minimizing the feeling of competition by putting the classroom teacher in partial control of the follow-up material and as a way of keeping the teacher involved directly in the success of programs, and as a way of helping to integrate this series into the social studies curriculum as a whole.

Thus, however reluctant had been our first move toward including the classroom teacher in our series, we were later to accept the idea as an important one especially in the treatment of this type of content. This is in harmony with the lately emerging concept of regarding the classroom teacher as a manager of instructional resources. Under this theory the teacher would have television, film, film-strips, slides and demonstrations all available and would call upon them as they happened to fit into her own teaching plans and objectives - not as her plans happen to fit into the material presented by the machines. The teacher must remain in control of at least part of the material and must feel that the use of television for that half-hour is the best use she can make of that time rather than as a superimposition on an already crowded teaching day.

PRODUCING THE REVISED SCRIPT

Armed with an analysis of the performance of the small test groups, strengthened by increased knowledge about the process, and hopeful of doing better, we rewrote and restructured the first lesson. In the early period of the Project these overhauls of the script were fairly major largely due to the radical paring down and reshaping of the content referred to earlier. As the Project progressed the refinements became finer and finer as the content became more firmly established.

In the early phase we generally had to repeat the whole double rehearsal process due to the great number of changes. However, in the later phases when some portions of a script were carried forward intact, or, at least, the visual sequences remained essentially unchanged, we eliminated the rough (first) rehearsal.

LARGER GROUP TESTING IN THE STUDIO

Beginning with the third version of Lesson 1, we made the decision to test our program on larger groups of students. Part of the reason for this was purely mechanical. Principals from the participating schools in the Washington D.C. Area were more willing to allow a full class of thirty students to come to the studio for the half-day rather than a few selected from those classes. Even though we were dealing with larger groups we still specified the 90-120 IQ range if possible because we were basing our revisions on feedback from them (i.e., this type of student had, in fact, become our target population).

However, at this point we added a new element to the feedback. During two such sessions when the students were at the studio for the viewing, we had a hidden TV camera set up to record the students taking the lesson. On the first such occasion the camera was on top of a lighting platform very near the light grid shooting directly over the monitor being watched by the students. A microphone was suspended over the students. The camera was unattended, being capped electronically from the master control area. On the second occasion the students were in WETA's Studio B seated facing the control room window, with the monitor directly in line in between. This time the camera was in the control room above the studio floor and commanded a view of the students similar to that used in the previously recorded testing session. On both occasions a second camera source was used to insert the program they were watching into the upper left-hand corner. On neither occasion did any of the students spot the camera, nor were they aware that they were being recorded.

While detailed research on the subject was well beyond the scope of the project, we felt that having a record of student activity, during a lesson would be valuable as an additional element to correlate with pre and posttest and worksheet performance. In addition we hoped to observe group and individual reactions to sections of the program to look for confused facial expressions, and to look for any deterioration of overt response activity as the program got towards the end. While we did find this a valuable tool its value was not fully exploited due to the limits of time. Nevertheless its potential, we feel, is great.

However, even though the students were not aware of the fact that they were being recorded, posttest results strongly led us to suspect that the experience of coming to the studio to be tested had had a "Hawthorne" effect. Yet even as mitigated by this, there was clear evidence of significant student learning.

At the conclusion of the second taped session (which was about the sixth session of testing various sized groups at the studio) we made the decision to conduct the next series of tests in the schools themselves. Our hope was to reduce the possible "Hawthorne" effect involved in getting the students to the studio by testing them in their own classrooms under the supervision of their own teacher. As will be discussed later, we did this in a single school first, to determine what logistical problems might arise, in a larger testing and later in a group of 5-10 schools.

However, before we could do any of this we went back to the drawing board for further revisions. Again, our revisions were based in part on feedback from the students and in part on the restructuring of the scripts necessitated by a further limitation in the amount of curriculum material to be covered.

FURTHER REVISION

It was during the preparation of the lessons to be used in in-school testing, that we reached the final decisions on the content objectives as outlined earlier in this report. By this time there was precious little left of the "baseline" of the first versions of the lessons. In terms of "Working Paper # 1" we were essentially taking two lessons to teach what was covered under the heading "Population" in the paper. The third lesson was devoted to a case study of the Australian Aborigines, which was approximately the equivalent of one of the case studies proposed in the original working paper.

As mentioned earlier the major thrust of effort at this point was in defining and scripting the above content. Although there was some revision based on the feedback from students in those few segments that were carried forward from the previous versions, the major value of the preliminary versions was in the development of techniques to handle visuals, in establishing a successful format, and in streamlining the production process. We also were developing empirically established patterns of pacing and rate of content development and the degree of complexity of the questions we could expect students to handle in either written or spoken form.

At this stage nearly all of the decisions about methods and techniques of handling visuals had been made.

However, one major decision that had not been made yet had to do with whether and to what degree to involve the classroom teacher. As mentioned earlier, our eventual decision to ask the classroom teacher to play an active role was based in part on the fact that some of the response that we felt were very important and relevant simply took too much time to be made during the videotaped lessons. In addition, we wanted to involve the teacher in the content and give her at least partial control of the use of the material so that it could be more easily integrated into the rest of a teaching plan.

This turned out to be more than a simple matter of allocation. It enabled us to restructure the first two lessons in such a way that we could deal with the population being studied from two relatively simple points of view within the program. Then because the students were going to complete a description of this population after the lesson, by choosing their own additional points of view, making up their own information about the people, and arranging them into groups. Since there were no "right answers" to this sort of excercise,we couldn't handle it at all within the program itself, (i.e., it would be impossible to give confirmation to the students). Thus by giving the teacher a role in handling this exercise, we opened up the possibility of asking a new type of question, the "answer" to which was not a specific response but rather the application of what had been learned during a lesson to new situations. In other words, to test whether or not the students knew what was meant by an "overall description of a population" within the program, the questions would have to be in general terms, requiring relatively short answers or choices from among verbal expressions. However, by the method described above we could get away from verbalizing the process and elicit, as a response, the behavior of developing "an overal description" of a population.

Following the writing of the scripts we began the process of rough and dress rehearsal and production.

TESTING IN SCHOOLS

While the final scripts were to be prepared and produced plans were being made for in-school testing. As mentioned earlier, the decision had been made to do this in two phases. The first phase would involve a single school and would use only one class to determine what problems might arise in such classroom testing. In addition, it would provide a field test for the "Guide for Teachers". Phase two of our in-school testing would consist of selecting 5 schools having a total of 10 fifth grades and testing the lessons on this larger population.

All other things being equal, we decided to choose a school for phase one that had a one-way window in an "observation classroom." Through the cooperation of the Prince Georges County Board of Education and Mr. Larry Hervey from that county, we were fortunate to locate such a school, the James Ryder Randall Elementary School in Clinton, Maryland. In this school we would have the opportunity to observe the overt behavior of the students both during the lesson and during the discussion that followed without having the student's behavior affected by our presence.

The arrangements were made with the school early in the semester and the particular class to be tested went to the special observation room for nearly two months on every occasion that they used television. Thus, by the time they took this series of lessons, the room had become the "usual" place they went to watch television. All arrangements were made with the principal, Mrs. Gladys Page and the teacher, Mrs. Elaine Wallace. The students were not aware that they were to be tested until the Friday preceding the first telecast when a member of the Project Staff gave them the pretest.

The choice of schools turned out to be a very lucky one, both because of the excellent cooperation we received in following through in every detail, but also because of the continued interest in the Project and desire to help on the part of everyone at the school. At one point, Mrs. Wallace and another fifth grade teacher at the same school, Mrs. Church, came to the WETA studios to preview the first lesson and to serve as consultants on the design of the teachers' guide. Even though her students were not participating in our test, Mrs. Church allowed us to test the preliminary form of the test on her class. This testing proved to be very valuable in terms of the wording and structure of some of the questions and the length of responses.

By the time the lessons were ready for viewing by Mrs. Wallace's class, the teachers' guide and pretest had been revised and improved.

During the broadcast of the first two lessons there was a motion picture camera set up in the observation room. Portions of this film can be seen in the film report of this project.

The week following the tests in Mrs. Wallace's class we began phase two of the in-school testing. For this purpose we had selected five schools, each of which had only two fifth grade classes. We selected schools of this size in order to get the full range of academic abilities as represented by the full fifth grade in each school. The particular schools were selected on the following basis: one school with relatively low academic standing in a relatively deprived socio-economic area; one school with a relatively high academic standing in a relatively high socio-economic area; and three schools with average academic standing in an average socio-economic area. At least one of these last schools was to have a fairly large minority group representation.

The schools, not in the order indicated were: Barrett Elementary School, Arlington County, Virginia; Brandywine Elementary School, Prince Georges County, Maryland; Groveton Elementary School, Alexandria, Virginia; Mt. Daniel Elementary School, Fairfax, Virginia; and Westbrook Elementary School, Montgomery County, Maryland.

Although it was not and is not ultimately necessary or possible, the Project talked through the entire procedure with each teacher in advance. This was done as a safety measure for two reasons: first, our total learner population was less than 300 so that we couldn't risk losing 10 or 20% through preventable misunderstanding; and secondly, the test came in the last full week of the school year.

CONSTRUCTING THE TESTS
(DEVELOPMENTAL AND FINAL)

Someone has said that a good program is not just well devised; it must be well revised -- not simply well written, but continually rewritten as well. In order to establish a basis for this all-important process of revising and rewriting, instructional programers try out their program with small groups of students during the period when it is being developed. This type of student trial is what we have referred to earlier as "developmental testing." This type of trial or testing does not always refer to a trial where students are actually given an actual test before and after the trial; some programers use only the responses made by learners during the trial of the program as a "test." However, in many cases the learners are given a test before and after they have taken the program. This project employed the use of such "before and after" tests as it tried out lessons developmentally.

Ideally, such tests should be the direct by-product of a thoroughgoing behavioral analysis that has been completed before any part of the program has been written. Furthermore, once such a test has been used to measure the effectiveness of the first version of a lesson it should not be changed. If it is not changed it may become the basis of a valid comparison between that version of the lesson and later versions. Unfortunately, the "softness" of the content with which we were dealing in these lessons precluded this approach to the creation and use of our developmental tests.

The approach we found ourselves taking to the creation of the developmental tests as well as to the "final" or "validation" test which was used to assess the performance of the series as a whole may be described as follows:

1. As described in a previous section, each lesson in the series was conceived in terms of a series of responses to be made by the learners in the course of the lesson. This meant that the test for that lesson would require that the learner make equivalent (but never precisely the same) responses to equivalent (but never precisely the same) stimuli as those employed during the program.

2. Once these responses had been identified the writing of the lesson and the developmental test was begun. This often meant only that a few potential test items were drafted at the beginning of the script writing and revised as the writing progressed.

3. As a lesson was being drafted and we came to grips with the problem of designing and writing the various sequences in it, we found that ways of testing for the objectives of those sequences were frequently suggested. In actuality, this meant that at almost any time during the writing of a script an idea

for a test question might be jotted down and put aside along with possible test items for that lesson. Sometimes this resulted in the creation of 4 or 5 items designed to test for a particular response, only one of which was finally chosen for inclusion as part of the test for that lesson. Proceeding in this way, by the time a script was completed there were usually a selection of items from which to make a test. However, there were occasionally some sequences within the lesson for which test items had not been created. Items for these sequences were then written, after draft of the lesson had been completed.

4. When the lesson had been produced, on videotape and tested (developmentally), in the studio we would often find that there were sequences that, for one reason or another, would have to be dropped from the lesson. This meant, of course, that certain test items, too, would have to be dropped from the test. Occasionally, there were new sequences added or existing sequences were expanded. When this occurred it was usually the result of our having discovered something that would have been turned up by an adequate behavioral analysis had we had the skill and the time to have conducted one.

6. The final test used to assess the performance of the series as a whole was made largely from items that had appeared earlier on developmental tests. However, the final test also contained items that were designed to test for cumulative learning;

items designed to test how well the third (last) lesson in the series had helped the learner to integrate what he had learned during the previous two lessons.

This process of test development, while defensible in terms of the content difficulties encountered by this project resulted in the staff's not being able to fulfill one of its primary goals; the goal of clearly establishing a set of objectives and then developing a test for each lesson based on those objectives. Each test would then have been "held still" throughout a number of revisions, and in this way we would have been able to compare later versions of our lessons with earlier versions. However, establishing such a "constant" in the form of unchanging tests was quite impossible because of the fact that the behavioral analysis on which our tests depended continued throughout the entire period of developmental testing. As a result, about the only "constant" operating throughout the period of developmental testing was constant change.

An important difference between our developmental tests and what we have called the final or validation test is that each developmental test was designed to assess the effectiveness of a single lesson in the series, and was used to provide us with a basis for revising that particular lesson. Therefore each such developmental test was designed to give us as much information as possible about the performance of that lesson. For instance, the developmental test for Lesson 1, took many learners as long to complete as the lesson itself (both about one-half hour). Considering the fact that the test was given to the learner as a pretest and a posttest, this means that the process of developmentally testing a lesson often took an hour-and-a-half. We found that this sort of detailed testing was essential to getting the amount of feedback we needed to revise a lesson. However, when it came to the testing of the series as a whole, the same tests were not used because it was out of the question to subject fifth grade children to what would have been a minimum of an hour-and-a-half of test taking before and after two hours of television instruction. This meant building a test that was made up of some of the items previously used on developmental tests, and other items as well.

When a final or "validation" test had been drafted two parallel forms of it were tried with two fifth grade classes in order to give us an opportunity to test its format, the wording of a number of questions and to ascertain, as best we could, whether or not the two forms of the test were, indeed, parallel.

These trials of our "final" test resulted in an extremely truncated set of scores on both forms of the test (i.e., the means were about 12 on a 100-point scale). This made it impossible to ascertain whether the two forms were parallel. Furthermore (based on a previous trial of the final versions of the first two lessons of the series), we suspected that our posttest results would be truncated toward the opposite end of the scale. Therefore, it was decided to use the following validation procedure: When the series was tried in the five schools mentioned in the preceding section, we gave half of the children one form (Form A) of our final test as a pretest and the second form (Form B) to the other half.* The forms were then reversed for the posttest. The differences in the mean scores between the two forms of the test on both pretest and posttest were so insignificant (statistically and otherwise) that we concluded that the two forms of the test are parallel.

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*The children were divided according to boys and girls and lined up alphabetically with girls on one side of the room and boys on the other. We then gave Form A to the odd numbered children and Form B to the even numbered. For the posttest each child was given the form he had not taken as a pretest.

SUMMARY OF TEST RESULTS

The pattern of results from our testing reflected almost directly the outline suggested by the pattern of schools selected. That is, there was one school in which both classes did relatively poorly, one in which both classes did relatively well, and three schools that had students through the range. Significantly for purposes of analyzing the data, all three schools that were in the average group had homogenous grouping so that each of them had one class generally above average and one generally below average. The result was that there were two distinct groups of classes -- 5 average and above, 5 below average. The IQ levels and the general characteristics of each of these groups were appreciably different. As it happened the average to above average group of five classes corresponded very closely to the type of "target population" we had been using throughout the project as test subjects.

For purposes of further analysis the two groups will be treated separately, with the average to above average group being labeled "Target Group" to indicate this is the kind of group we were prepared to teach, and the below average group simply labeled "less able."

As the data on the following pages indicate the lessons did considerable more teaching to the "target group" than to the "less able" group. Recognizing the existent errors of measurement and noise introduced by other sources into final test performance, the ideal criterion might be the achievement of a score of 90% or better by 90% of the target population. However, early in the project we indicated that we did not expect to reach such a criterion, but settled upon a minimum standard that students should, on the posttest all score in excess of the median of the pretest. The above results show that only one student in the target group of 148 or 9.7% of the population failed to meet this minimum standard.

The mean score on the pretest for the target group was 19.2% while the mean score on the pretest for the less able group was 11.6%, or about 7.6% less. The respective mean scores on the posttest were 66.2% and 42.4%, a difference of 23.8%. Taking the group as a whole the mean score on the pretest was 15.4%, while the mean score on the posttest was 56.2%.

These data are represented graphically on page 105. The "ideal" line in the upper right-hand corner of the diagram represents the familiar 90 by 90 (90% of the students achieving 90% of the material) ideal criterion.

One conclusion that we obviously draw from the foregoing data is that the same televised lessons simply are not effective for all students. At least two versions of our lessons would seem to be necessary, each aimed at different

TEST RESULTS OF 5 CLASSES IN TARGET GROUP

CLASS A-1

Range of Scores (%)	PRETEST Number of Students	PRETEST Percent of Students	POSTTEST Number of Students	POSTTEST Percent of Students
0 - 9	5	16.1		
10 - 19	12	38.7		
20 - 29	9	29.0	1	3.2
30 - 39	4	12.9	2	6.5
40 - 49			4	12.9
50 - 59	1	3.2	1	3.2
60 - 69			9	29.0
70 - 79			11	35.5
80 - 89			2	6.5
90 - 100			1	3.2
	31	100.0	31	100.0

CLASS A-2

Range of Scores (%)	Number of Students	Percent of Students	Number of Students	Percent of Students
0 - 9	5	13.9		
10 - 19	19	52.8		
20 - 29	10	27.8		
30 - 39	2	5.5	2	5.5
40 - 49			1	2.8
50 - 59			12	33.3
60 - 69			9	25.0
70 - 79			3	8.3
80 - 89			6	16.7
90 - 100			3	8.3
	36	100.0	36	100.0

CLASS B-1

Range of Scores (%)	PRETEST Number of Students	 Percent of Students	POSTTEST Number of Students	 Percent of Students
0 - 9	1	3.8		
10 - 19	5	19.3		
20 - 29	10	38.4		
30 - 30	9	34.7		
40 - 49	1	3.8		
50 - 59			1	3.8
60 - 69			6	23.1
70 - 79			10	38.4
80 - 89			8	30.8
90 - 100			1	3.8
	26	100.0	26	100.0

CLASS C-1

Range of Scores (%)	Number of Students	Percent of Students	Number of Students	Percent of Students
0 - 9	1	3.3		
10 - 19	18	60.0		
20 - 29	9	30.0		
30 - 39	2	6.7		
40 - 49			6	20.0
50 - 59			6	20.0
60 - 69			6	20.0
70 - 79			7	23.3
80 - 89			2	6.7
90 - 100			3	10.0
	30	100.0	30	100.0

CLASS D-1

Range of Scores (%)	PRETEST Number of Students	PRETEST Percent of Students	POSTTEST Number of Students	POSTTEST Percent of Students
0 - 9	6	24.0		
10 - 19	11	44.0	1	4.0
20 - 29	6	24.0		
30 - 39	2	8.0	1	4.0
40 - 49			2	8.0
50 - 59			5	20.0
60 - 69			9	36.0
70 - 79			4	16.0
80 - 89			2	8.0
90 - 100			1	4.0
	25	100.0	25	100.0

SUMMARY OF TARGET GROUP

Range of Scores (%)	Number of Students	Percent of Students	Number of Students	Percent of Students
0 - 9	18	12.2		
10 - 19	65	43.9	1	0.7
20 - 29	44	29.7	1	0.7
30 - 39	19	12.8	5	3.4
40 - 49	1	0.7	13	8.8
50 - 59	1	0.7	25	16.9
60 - 69			39	26.4
70 - 79			35	23.6
80 - 89			20	13.5
90 - 100			9	6.1
	148	100.0	148	100.0

TEST RESULTS OF 5 CLASSES IN LESS ABLE GROUP

CLASS E-1

Range of Scores (%)	PRETEST		POSTTEST	
	Number of Students	Percent of Students	Number of Students	Percent of Students
0 - 9	3	16.7		
10 - 19	10	55.5		
20 - 29	5	27.8	3	16.7
30 - 39			5	27.8
40 - 49			2	11.1
50 - 59			2	11.1
60 - 69			4	22.2
70 - 79			1	5.6
80 - 89			1	5.6
90 - 100				
	18	100.0	18	100.0

CLASS E-2

Range of Scores (%)	Number of Students	Percent of Students	Number of Students	Percent of Students
0 - 9	10	50.0		
10 - 19	9	45.0	3	15.0
20 - 29			2	10.0
30 - 39			5	25.0
40 - 49	1	5.0	1	5.0
50 - 59			6	30.0
60 - 69			1	5.0
70 - 79			1	5.0
80 - 89			1	5.0
90 - 100				
	20	100.0	20	100.0

CLASS B-2

	PRETTEST		POSTTEST	
Range of Scores (%)	Number of Students	Percent of Students	Number of Students	Percent of Students
0 - 9	7	29.2		
10 - 19	10	41.6	3	12.5
20 - 29	7	29.2	2	8.3
30 - 39			9	37.5
40 - 49			5	20.8
50 - 59			1	4.2
60 - 69			2	8.3
70 - 79			1	4.2
80 - 89			1	4.2
90 - 100				
	24	100.0	24	100.0

CLASS C-2

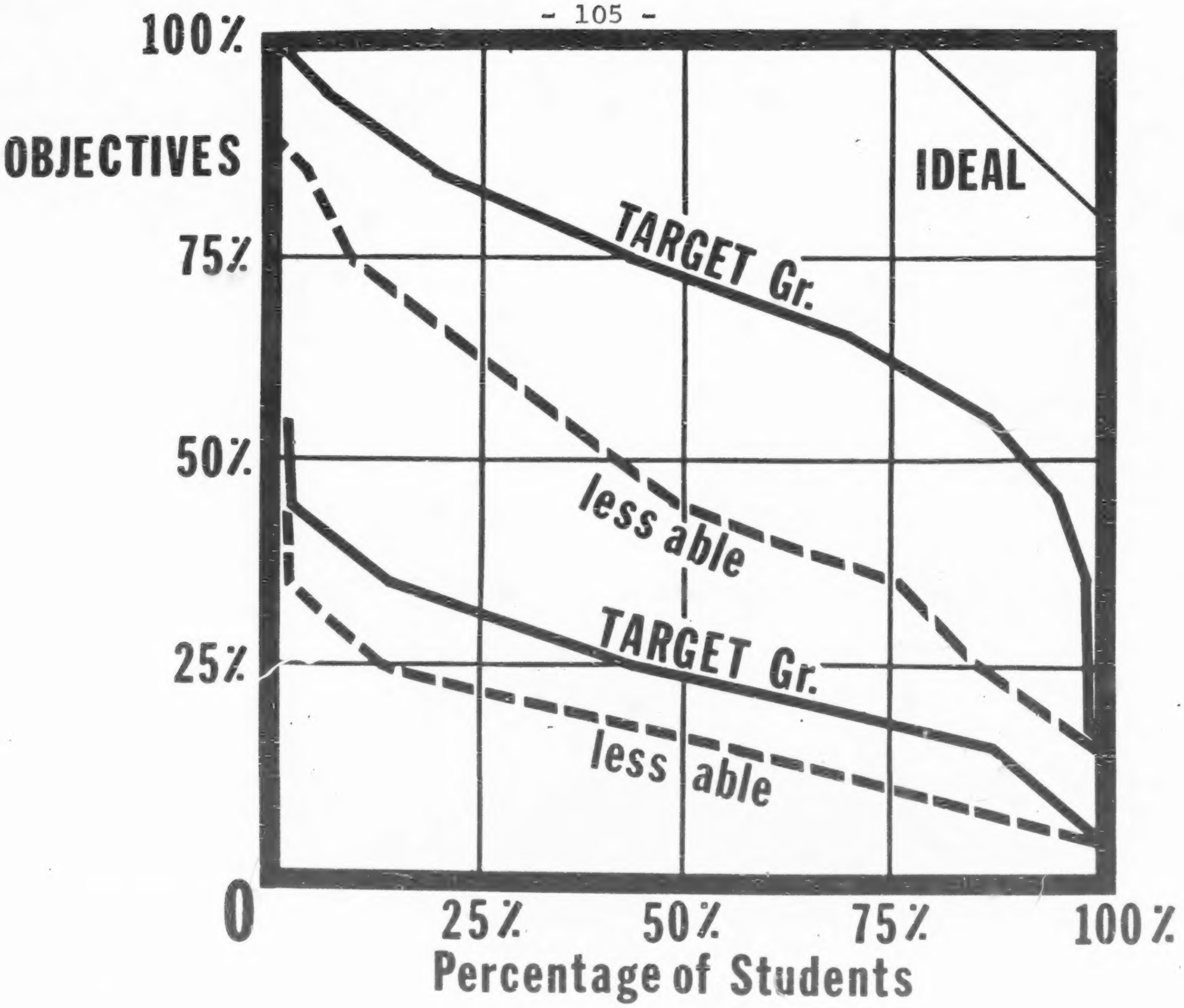
Range of Scores (%)	Number of Students	Percent of Students	Number of Students	Percent of Students
0 - 9	17	73.9		
10 - 19	6	26.1	6	26.1
20 - 29			3	13.0
30 - 39			7	30.4
40 - 49			2	8.7
50 - 59			3	13.0
60 - 69			2	8.7
70 - 79				
80 - 89				
90 - 100				
	23	100.0	23	100.0

CLASS D-2

Range of Scores (%)	PRETTEST		POSTTEST	
	Number of Students	Percent of Students	Number of Students	Percent of Students
0 - 9	9	42.9		
10 - 19	11	52.4	2	9,5
20 - 29			1	4.8
30 - 39	1	4.8	3	14.3
40 - 49			4	19.0
50 - 59			3	14.3
60 - 69			5	23.8
70 - 79			2	9.5
80 - 89			1	4.8
90 - 100				
	21	100.0	21	100.0

SUMMARY OF LESS ABLE GROUP

Range of Scores (%)	Number of Students	Percent of Students	Number of Students	Percent of Students
0 - 9	46	43.4		
10 - 19	46	43.4	14	13.2
20 - 29	12	11.3	11	10.4
30 - 39	1	0.9	29	27.4
40 - 49	1	0.9	14	13.2
50 - 59			15	14.2
60 - 69			14	13.2
70 - 79			5	4.7
80 - 89			4	3.8
90 - 100				
	106	100.0	106	100.0



RESULTS OF THE SIGNIFICANCE OF DIFFERENCES IN LEARNING BY ABILITY LEVELS

	Pretest		Posttest				
Group	$\overline{X}$	σ^2	$\overline{X}$	σ^2	t	d.f.	p
Target Group	9.6	16.8	33.1	84.0	26.00	147	$<.001$
Less Able	5.8	24.9	21.1	86.4	14.98	105	$<.001$

target groups. Had our test classes been in three more or less distinct groups, the conclusion might be that at least three versions are necessary to do the job. The question ultimately becomes an economic one rather than an educational one, but the indication clearly seems to be that the tend toward individualizing instruction is more desirable educationally, if not economically.

A final word needs to be said about these figures and what we feel could have been done had there been an opportunity to make a revision following this in-school testing. Because the final versions ofthe lessons that were shown to the students were so markedly different in content and in their approach from the earlier versions, it is impossible to try to correlate the percentage gain of learning with the extent of revision. However, we feel that armed with the results of this testing, an additional version of these lessons aimed at the target group could come significantly closer to the "ideal" of 90-90. It is idle to speculate just how much closer, but suffice it to say that the testing was very revealing with regard to certain weaknesses in the lessons as they now exist. Perhaps it would take even one or more revisions after that one before the "ideal" could be reached, but possibly it never could be reached, economically.

Perhaps, as the data seem to indicate, it would be appropriate to design two new versions -- one for the target group and one for the less able group. Such factors as motivational sequences, slower pacing, making the responses more openly a game of trying to beat the "machine" and the like could significantly alter the form of the lessons as they now exist. These and many other questions are simply left unanswered by the necessary limitations of time and money.

CONCLUSION

THE PROJECT ENDS AT A BEGINNING

As indicated by the preceding section, the in-school testing that was done at the end of this project represents only the start of the final phase of the validation process as we originally conceived it (i.e., it is where we had hoped to be much earlier in the Project, but for the reasons outlined above, this simply didn't happen). This means that although the Project is complete, the process of improving its product is not. The purpose of the Project was to demonstrate empirically validated, "programed" television instruction. With the first version of Lesson 1, the Project achieved a measure of success in fulfilling part of its purpose by showing that television could be used for an audio-visual programed presentation. With the second version the Project demonstrated that television could be used to elicit written responses. With the third version spoken and hand-raising responses were added successfully. In later versions the active response mode created by the lessons enabled us to lengthen programs and maintain learner interest and attention. Furthermore, the project has demonstrated all this with a series of lessons rather than with a single lesson as had only been done previously. Unfortunately, however, the many changes in content made it difficult to carry out as thorough a validation of the series as we had planned.

The requirements of the Project led to the development and invention of a new device for presentation of visuals to the television camera. But, these things do not represent the major achievement of the Project. Perhaps the biggest barriers to the use of television as utilized by this project have been as much psychological as mechanical or technical. This project's best efforts were toward breaking through the rather inert traditions of instructional television production through the introduction of a new degree of rigor in the specification and design of the material to be used in the lessons. This required analysis of the content in terms of the kinds of predictable changes in the learner's knowledge and skills. With such specification of content objectives, television was shown to be capable of handling material that in and of itself was not capable of arrangement into discrete categories or strictly linear presentation. Furthermore, we believe that television can, when used in this manner, go well beyond its all too frequent use as a distributor of "show and tell" enrichment programing, and be shaped into a medium capable of better and better direct instruction.

Having said this, it is equally important to point out that the problems that we encountered all along the way were, indeed, formidable. Perhaps the identification of them (if not the solutions to them) was also an important function of this project.

Paramount among the problems, and the one from which many of the other problems flowed, was the problem of narrowing and shaping a statement of curriculum or content objectives and the translation of those objectives into lessons that would thoroughly engage the learners in behavior relevant to these objectives.

The struggle to define and specify objectives has been covered earlier in this report, yet the results of our in-school testing point up the fact that the battle has just been joined. The implications of these test results for the broadcast media as a means of direct instruction are broad indeed. For although it may be reasonable to suppose that with one or two more revisions, a very high level of learning (possibly even the "ideal of 90-90") could be achieved in the target group, we strongly suspect that something quite different would be needed to make these lessons function effectively for less able classes. Therefore we come away with the deep conviction that if television is going to improve its ability to deal with group-paced, direct instruction, it is going to have to face this all-important question of how many different groups it is dealing with within any large number of students. Having faced this question, it must answer it in economic as well as educational terms.

THE FILMED REPORT

This project has also been reported in a 45-minute film which is available upon request from the U.S. Office of Education.

The film contains excerpts from each of the lessons and briefly describes the content as it was finally developed. It also discusses the input components of script writing and the preparation of visuals for the lessons. The "Animator" is used in the film and demonstrated.

Finally, the film presents a summary of the data and discusses some of the implication and tentative conclusions of the Project. It is recommended that this written report be accompanied by a viewing of the Filmed Report.

In addition to the Filmed Report and the "final" versions of the three lessons produced by the Project, all the developmental versions of these three lessons as well as all versions of the earlier lessons produced by the Project have been transferred from videotape to 16 mm film via kinescope. While only the three "final" lessons are to be made generally available, the developmental versions are available for viewing by special arrangement with The Institute of Educational Technology.

QUESTIONS FOR FURTHER RESEARCH

While it would be impossible to cover every possible need for further research in the general area of programed audio-visual instruction, we would like to mention some questions that have been suggested by this project in particular.

Concerning the role of the classroom teacher to a televised lesson:

A. No teacher on camera; how does this affect the acceptance of the program by the classroom teacher?

B. Effect of requiring an almost "programed" follow-up by the teacher of a programed television lesson?

C. Participation of classroom teachers in program design and how this affects utilization?

Concering the learners:

A. Effect of no television teacher on the screen and reactions to use of different types of voices, or two or more voices?

B. Effect of blank screen and extensive use of captions?

C. Same material as these lessons moving at a faster pace with smaller stepsize?

D. Same material but larger steps and slower pace?

E. Relative effects on retention of the four response modes used in the lessons produced by this project (i.e., constructed oral response, selected oral response, constructed written response, selected written response). Given these four response modes, what are optimum patterns for effective learning?

F. If TV lessons with follow-up printed material or exercises are more effective, what is the optimum amount and type of such follow-up?

G. Comparative results from programed television lessons and the same material programed in book form?

Concerning television production:

A. Great need for further research on use of motion, reality and visual configuration?

B. Given that color will soon be a convention in E.T.V., what are the possibilities of color for prompting?

C. Effectiveness of use of "fade-in" captions as prompts?

D. What is the proper ratio of stimulus time to response time given various types of content (i.e., skills, information, concepts, etc.)?

Of all of the questions suggested above, questions concerning use of motion, reality and visual design and configuration are the questions which plagued us day after day throughout the life of the Project.

THE IMPACT OF THIS PROJECT ON OTHERS

The Project has already begun to have some impact on the design of instructional programing at WETA-TV. There has been noticeably more awareness of and interest in the need for a clearer statement of objectives for each lesson and series. While there is no indication yet that there will be use of printed worksheets or written responses required within lessons, the station's hesitation to initiate this practice is due in part to the size of the school population being served -- over 200,000 elementary school students.

The "Animator" device developed by the Project has already been used in several series at the station, and its use in the coming year is expected to be much greater.

In addition, the National Center for School and College Television in Bloomington, Indiana, has indicated an interest in acquiring rights for possible distribution of this and other experimental approaches to the programing of television.

However, the hoped for impact of this project will come when and if others who are responsible for the production of instructional television (i.e., the audience for whom our work is intended) look at the series produced by this project and say, "They did some interesting things, but we can do them very much better", after which they proceed to try. If this happens, we will feel we have accomplished what we set out to do: To help demonstrate that new ground can be broken in instructional television and that new and more effective ways of using the medium of television for education can be devised.

Lest we give the impression that this project has implications only for the television medium, it should be pointed out that the technique used in our third lesson (see Appendix A, Lesson 3) of restructuring (editing) existing films of the Australian Aborigines in order to turn them into a programed lesson is being seriously considered by a number of major producers of instructional films. We feel that this approach, if widely used, can only improve the effectiveness of film in the instructional process.

APPENDICES

APPENDIX A

Immediately following is a ten page excerpt from the next to last version of Lesson 1 ($1H^a$). It is reproduced here with all of the last minute changes and directions that were made as it was being produced. In its entirety, this version was twenty-one pages long.

Following this excerpt, is the "final" version of this lesson ($1H^b$). It, too, includes all the battle scars of last minute studio changes. This revised version is fifteen pages long.

278

OLD SOLT

TC 1H^{a}

VIDEO	KEY	AUDIO
① CC 1 U. S. Department of Health, Education and Welfare Office of Education Division of Educational Research PRESENTS (pull) "CHANGING POPULATIONS IN A CHANGING WORLD" (pull) Lesson 1 "DISCOVERING WHAT A POPULATION IS LIKE" DIP TO BLACK		Lesson 1 H^{a}
ANIM		When you hear the word (pause)
POPULATION		POPULATION you probably think of
		people...
		and more likely...
		a rather large number of people...
town		such as ALL the people living in
		a town
① SLIDE		
New York City		a city
ANIM		
② State		a state
U. S.		a country
(dissolve)		or even the whole...come on and
		say it aloud...

VIDEO	KEY	AUDIO
① **STUDIO**		
globe		The whole..world
② **ANIM**		
POPULATION		But the word POPULATION doesn't always have to refer to just people who live in a city, state, or country...
ANY GROUP OF PEOPLE ANYWHERE		It can be used to mean ANY GROUP OF PEOPLE..ANYWHERE...
⑦ **SLIDE**		
Abos		It can be a group of natives in a remote part of Australia...a group of
scientists		scientists in Antarctica...
girl scout camp		a group of girl scouts at a summer camp...
NYC		the nearly 8 million people in the city of New York...
Jiggs		or all the nine people of Jiggs, Nevada, who can all fit into this small bus...
	3 on 7	
Robinson Cursoe	ANSWER ALOUD	In fact, even a man alone on a desert can be called a ___what? (pause) island, would be a population... yes a population... A population of how many?
		(pause) (tone)
	3 on 7 **CC-3** ANSWER ALOUD	

VIDEO	KEY	AUDIO
		Yes, of course. A population of one.
7 **SLIDE**		Now, if a population can be found ~~any-~~
NYC		~~where from~~ in New York City...
abos		~~to~~ in Australia...
man on island		~~to~~ on a desert island...
Jiggs		~~to~~ in a town in Nevada...
12 **ANIM** YOU CAN FIND A POPULATION JUST ABOUT ___?___	Matt Black	Then you can say that you can find a population just about ___?___
		(pause) (tone)
	3 on 2	Now, write this answer on your worksheet. next to number 1
	CC-3 (1, out)	

	VIDEO	KEY	AUDIO
②	ANIM ANYWHERE		Yes, populations can be found just about ANYWHERE. and...
⑦	SLIDES man on island		If populations can contain... one person...
	Jiggs		nine people...
	NYC		nearly 8 million...
②	ANIM US		or over 190 million people...,
①	~~ANIM~~ CC-1	3 on 1	Then in addition to being found anywhere, a population can be of any ___?___
	A POPULATION CAN BE OF ANY ___?___	②	(pause) (tone)
		(② out)	That's right, a population can be of any SIZE or number.
	SIZE OR NUMBER		
	pull A POPULATION CAN BE: ANY SIZE AND CAN BE FOUND ANYWHERE		Well, if a population can be of any size and found anywhere...
②	ANIM apt house		~~Here is a small apartment house near Washington, D.C.~~
		3 on 2 CC-3	Can we call the people who live in this apartment house near Washington DC a population? (pause) (tone)
		ANSWER ALOUD	
			Yes, of course, the people who live in this apartment house can be called a population. But how many people does this population contain?

VIDEO	KEY	AUDIO
		Well, you can't tell by just looking at the front of the house can you?
dissolve to population		But, when you look inside this apartment house (pause) you can count them for yourself.
	3 on 2	Do that now, then write down the size of
	CC-3	this population next to number 3 on your
	③	worksheet.
① CC-1		(tone)
worksheet on 3	(③ out)	(pause) (counting)
② ANIM gen pop		~~So~~ now, in addition to knowing where this population is located, you also know that it contains 18 people.
① CC-1 ~~YOU~~ CAN CALL ANY GROUP OF PEOPLE OF ANY SIZE ANYWHERE A ___?___	3 on 1	And you can call ~~those~~ this group of people, or any other group ~~of people~~ of any size, anywhere, a ___(what)___
	ANSWER ALOUD	
POPULATION		That's right: A population.
② ANIM gen pop	3 on 2	But if all you know about this population is that it lives in an apartment house and that it contains 18 people, you really don't know very much about it, do you? (tone)
	ANSWER ALOUD	

VIDEO	KEY	AUDIO
		No, not very much at all. But let's look at this population more closely.
men	3 on 2	Some of its members are men ...
women		others are ___?___
	ANSWER ALOUD	
		That's right...women...
children		and still others are ___?___
	ANSWER ALOUD	
		Right again..children...
gen pop		And Here's another way ~~[illegible]~~ of grouping the members of this population...
males		All of the MALES, including the men and the boys...
females		And all of the ___?___
	ANSWER ALOUD	
		Yes, all of the FEMALES, including the women and girls.
gen pop		Now its true that discovering that a population is made up of males and females--or that it contains men, women, and children is a step toward describing it, but it really doesn't give you a very ~~[illegible]~~ full picture of what this population is like, does it?

	VIDEO	KEY	AUDIO
①	CC-1 YOU NEED TO GO BEYOND THIS TO THE DISCOVERY OF MANY OTHER WAYS OF ARRANGING THE PEOPLE INTO GROUPS.		You need to go beyond this to the discovery of many other ways of arranging ~~the~~ its ~~people in it~~ members into groups that will give you a good overall picture of the population. (pause)
	YOUR JOB IN THIS PROGRAM: THE JOB OF GETTING A GOOD OVERALL VIEW OF A POPULATION.		And this is the job ~~that~~ you ~~are going~~ will ~~to~~ be doing during this program--the job of getting as good an overall view of a population as you can.
②	ANIM gen pop		And this apartment house population is the one I am going to ask you to start with...
①	CC-1 worksheet (hand points)		Now if your job is to give a good over-all description of this population, you need to know more than the fact that it contains 6 men 7 women and 5 children or that this population can be divided simply as 8 males, and 10 females.
②	ANIM gen pop		So, suppose you asked questions that enabled you to discover that some of the adults were employed at different jobs,

VIDEO	KEY	AUDIO
	3 on 2 CC-3 ANSWER ALOUD	and some were unemployed or without Jobs and some were housewives. And suppose you found ~~out~~ that you could group the children ~~into two groups~~ according to..those who ~~are~~ were in school and those who ~~are~~ were too young ~~to go to~~ for school. Would ~~that~~ adding these groups give you as good an overall picture of this population as you ~~can~~ could get? (pause) (tone)
		Well, no, there ~~are~~ other groups that probably should be added ~~to the list~~, but what are they? And how many should ~~you~~ be ~~look for~~ added?
② ANIM census taker		~~That is~~ These are the question the United States Government has to ask every ten years when it sets out to ~~do~~ conduct a census...Men like this census taker count every person in this country and ask questions that will ~~tell~~ help them ~~show~~ arrange the population ~~of the United States~~ into groups that will help us understand what our population is like. ~~is like.~~
apt house pop		Now, you are going to take a census... ~~That's what you are going to do now~~... ~~Take~~ a census of ~~this~~ these people who live in an apartment house...

VIDEO	KEY	AUDIO
		~~ask questions~~ that will help ~~us~~ you GET A GOOD OVERALL picture of what this ~~the~~ population is like ~~of this apartment house.~~
(1) CC-1 Worksheet section on men, women, children, etc.		Remember You already know these facts.
(2) ANIM gen pop Zoom in + pan 1½		But, in order to start getting a better overall view of this population, you will ~~are going to~~ need to look at these people from other points of view-from the point of view of the things they do— like working or going to school or playing—or maybe from the point of view of how much money they earn or the things they own, like T V sets or cars, ~~or [illegible]y~~ In other words you should be prepared to look at these people from any p of v ~~other points of view~~ that you think will help you give the best description you can of this ~~the~~ population.
Zoom out full		Now, as a start, I am going to give you some information about the people in each apartment. As I do I want you to listen carefully and see if what you hear suggests ~~other~~ ways of looking at this population and of grouping the people in it. I'll pause for a bit after we've looked

2

VIDEO	KEY	AUDIO
ANIM		into one or two apartments to see how many groups you have spotted...
Zoom to Apt. 1		Ready? Here in Apartment #1 you see a family in which the father has a job as an auto mechanic and goes to work everyday. The mother stays home to keep house and to take care of her daughter who is too young to go to school.
pan to Apt. #2		Here in the second apartment we find a man who works as an insurance salesman and whose wife runs the household. Their two children are in school. (pause)
pull out Apt #1 & #2		Well, have you spotted any ~~groups that~~ other ways of grouping these people besides as ~~you think ought to be added to your list~~ ~~of~~ men, women, and children, ~~and~~ or as males and females? For instance, what about
men in #1 & #2		these ~~men~~ two members? Did you learn anything about them that would suggest an~~y~~ new group that they belong to? (pause) Well, one works as an auto mechanic—the other works as an insurance salesman. What new group does this information

VIDEO	KEY	AUDIO
	3on2	suggest?
		(pause) (tone)
	ANSWER ALOUD	
① CC-1 worksheet Hand writes employed	3on1 EMPLOYED	Yes, they both work or are employed. So let's add a group called "employed" to your list like this. So far this
hand makes two marks		group has two members, so make note of ~~this~~ that fact in this way. (pause) Did you also notice
② ANIM school		that these two children belong to a group that you belong to--what group do I mean?
	3on2	
	SCHOOL CHILDREN	Yes, school children.
	↓	~~Now,~~ So add this group to your list, and don't forget to make a mark for each ~~one~~ child ~~of them.~~ in it. pause 5 beats
		(pause)
little girl in #1		~~Now,~~ But what about this little girl?... Does she belong to a group that you ought to have on your list, if you are going to get a good overall description of this population?...
	3on2 CC-3	(pause)
	ANSWER ALOUD	

New COY

repeats on 7, 11, 12

TC 1H^b

Page 1

VIDEO	KEY	AUDIO
-1 ✓ **SLIDE** U.S. Department of Health Education and Welfare ✓ Office of Education Division of Educational Research PRESENTS		**Lesson 1H^b**
-2 ✓✓ "CHANGING POPULATIONS IN A CHANGING WORLD"		
-3 ✓ Lesson 1 "DISCOVERING WHAT A POPULATION IS LIKE"		
✓ DIP TO BLACK		
ANIM		When you hear the word (pause)
1) ✓✓ POPULATION		POPULATION you probably think of people... and more likely... a rather large number of people... such as All the people living in
CC-1 ~~[illegible]~~ town		a town
SLIDE New York City		A city
ANIM ✓✓ State		a state
✓✓ U.S.		a country
(dissolve)		or even the whole...come on and say it aloud...
BLACK (dissolve) -4 ✓ SLIDE globe		The whole..world
ANIM ✓ POPULATION		But the word POPULATION doesn't always have to refer to just people who live in a city, state, or country...
✓✓ ANY GROUP OF PEOPLE ANYWHERE		It can be used to mean ... ANY GROUP OF PEOPLE...ANYWHERE...
SLIDE -7 x Abos		It can be a group of natives in a remote part of Australia...a group of
-8 x scientists		scientists in at the south pole ~~Antarctica~~...

	VIDEO	KEY	AUDIO
5-9x	girl scout camp		a group of girl scouts at a summer camp...
-10 x	NYC		the nearly 8 million people in the city of New York...
-11 x	Jiggs		or [redacted] the nine people of Jiggs, Nevada, who can all fit into this small bus...
x ✓	ANIM Robinson Cursoe	CC-3	In fact, even a man alone on a desert island, can be called a ___what___?(pause)
		✓ ANSWER ALOUD	Yes, a population. A population of how many? ______ (pause) (tone)
		CC-3 ✓ ANSWER ALOUD	Yes, of course. A population of one.
-12x	SLIDE NYC		Now, if a population can be found in New York City...
-13 x	abos		in the wilds of Australia...
	ANIM Man on island		on a desert island...
-14x ✓	SLIDE Jiggs		in a bus in Nevada...
✓	ANIM YOU CAN FIND A POPULATION JUST ABOUT ___?___		Then you can say that you can find a population just about ___?___ (pause) (tone) Now, write this answer on your worksheet next to Number 1.
		✓ CC-3 ✓ (① out)	
✓	ANIM ANYWHERE		Yes, a population can be found just about ANYWHERE. and...
✓	~~SLIDES~~ ~~ANIM~~ man on island		If a population can contain... one person...
	SLIDE Jiggs		nine people...
S-15	NYC		nearly 8 million people
✓ ✓	ANIM US	[redacted]	or nearly 195 million people....

VIDEO	KEY	AUDIO
11 ✓✓ A POPULATION CAN BE OF ANY ___?___		Then in addition to being found anywhere, a population can be of any ___?___
	CC-3 ② (② out)	(pause) (tone) That's right, a population can be of any SIZE or number.
12 ✓✓ SIZE OR NUMBER		
13 ✓ IF A POPULATION CAN BE: ✓ ANY SIZE AND CAN BE FOUND ANYWHERE		Well, if a population can be of any size and found anywhere...
14 ✓ apt house		Can we call the people who live in this apartment house near Washington, D.C. a population?
	CC-3 ANSWER ALOUD	(pause) (tone)
		Yes, of course, the people who live in this apartment house can be called a population, and ... How many people does this population contain? Well, you can't tell by just looking at the front of the house can you?
15 ✓ Dissolve to population		But, when you look inside this apartment house (pause) you can count them for yourself.
	CC-3 ③	Do that now, then write down the size of this population next to number 3 on your worksheet. (tone)
CC-1	(③ out)	(pause) (counting)
worksheet on ③		So now, in addition to knowing where this population is located, you also know that it contains 18 people.
15 16 ✓ ANIM ~~[illegible] pop~~ alu pop YOU CAN CALL ANY GROUP OF PEOPLE OF ANY SIZE ANYWHERE A ___?___		And you can call this group of people, or any other group of people of any size, anywhere, a ___what___?

VIDEO	KEY	AUDIO
	CC-3 ANSWER ALOUD	
⑰ ✓ POPULATION		That's right: A population.
⑱ ✓ gen pop		But if all you know about this population is where it is found and that it contains 18 people, you really don't know very much about it, do you?
		~~(cont)~~
	~~CC-3 ANSWER ALOUD~~	
		No, not very much at all. So let's look at this population more closely.
⑲ ✓ men		Some of its members are men...
⑳ ✓ women	CC-3 ANSWER ALOUD	others are ___?___
		That's right...women....
㉑ ✓ children		and still others are ___?___
	CC-3 ANSWER ALOUD	
		Right again...children....
㉒ ✓ gen pop		and here's another way of grouping the members of this population...
㉓ ✓ males MALES		All of the MALES, including the men and the boys....
㉔ ✓ females		And all of the ___?___
	CC-3 ANSWER ALOUD	
FEMALES		Yes, all of the FEMALES, including the women and girls.
㉖ ✓ gen pop		Now ~~its true that~~ discovering that a population is ~~made up of males and females--or that it~~ contains men, women, and children ~~is a step toward describing~~ does help to describe it

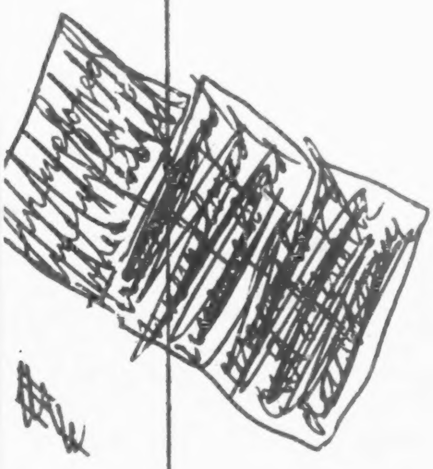
VIDEO	KEY	AUDIO
(40) **ANIM** gen pop (zoom in to #1 keep moving thru #6 and out)		But, in order to start getting a better overall description of this population, you will need to look at its members from many different points of view-from the point of view of the things they do--like working or going to school or playing--or maybe from the point of view of how much money they earn or the things they own, like T V sets or cars. In other words, you should be prepared to look at these people from any point of view that you think will help you give the best overall description
(end, zoom out)		you can of this population. Now, as a start, I am going to give you some information about the people in each apartment. As I do I want you to listen carefully and see if what you hear suggests ways of looking at this population and of grouping the people in it. I'll pause for a bit after we've looked into one or two apartments to see how many groups you have spotted....
(41) **ANIM** Zoom to Apt. 1		Ready? Here in Apartment #1 you see ~~a family in which~~ The father has a job as an auto mechanic and goes to work everyday. The mother stays home to keep house and to take care of her daughter. ~~who~~ Her daughter is too young to go to school..
pan to Apt. #2		In the Apt #2 ~~Here in the second apartment, we find~~ ~~a man who~~ the father works as an insurance salesman, ~~and~~ ~~whose~~ His wife runs the household. Their two children

VIDEO	KEY	AUDIO
✓ pull out Apt. #1 & #2		are in school. (pause) Well, have you spotted any other ways of grouping these people besides as men, women, and children, or as males and females? For instance, what about these two members?
42 men in #1 & #2		Did you learn anything about them that would suggest a new group that they belong to? (pause) Well, one works as an auto mechanic—the other works as an insurance salesman. What new group does this information suggest? ~~[illegible], they both~~ Both these men ____?
	CC-3 ANSWER ALOUD EMPLOYED	Yes, they both work or are employed. So let's add a group called "employed" to your list like this.
CC-1 work sheet Hand writes employed		So far this group has two menbers, so make note of that fact in this way.
Hand makes two marks		(pause)
43 ANIM children in #2		Did you also notice that these two children belong to a group that you belong to—a group made up of youngsters who are ~~[illegible]~~ in ____?
	CC-3 Fade in: IN SCHOOL	Yes, in school. So, add this group to your list, and don't forget to make a mark for each youngster in it. (pause)
44 little girl in #1	~~Key~~ (Key out)	But, what about this little girl?.... Does she belong to a group that you ought to have on your list, if you are going to get a good overall

	VIDEO	KEY	AUDIO
✓		CC-3	description of this population?...... (pause)
		ANSWER ALOUD	
		CC-3 ✓ PRESCHOOL	Well, I think she does, so add the word preschool to your list. (pause) Did you remember to put down one mark? (pause)
㊺	women in #1 & #2		Now, what about the women in these families--what group do they belong to that ought to be included in an overall description of this population? (pause)

VIDEO	KEY	AUDIO
	CC-3	Well, these women stay at home to take care of their families; instead of going out to work each day. So they belong to a group called ___what___? (pause)
	ANSWER ALOUD	
	✓ fade in: HOUSEWIVES	Yes, a group called housewives. pause
ANIM		Now before moving on to Apt. 3, can you tell me from what point of view we have been looking at these two men....
㊻ ✓ men in #1 & #2		
✓ POINT OF VIEW		from the point of view of...
㊼ ✓ WHAT THEY DO FOR RELAXATION		what they do for relaxation?
㊽ ✓ WHAT KIND OF FOOD THEY LIKE		what kind of food they like? or...
㊾ ✓ WHETHER THEY WORK OR NOT		whether they work, or not?
	CC-3 ④ (④out)	(pause) (tone) Check the correct answer on your worksheet Yes, we've been looking at the two men from the point of view of whether they work or not.
✓ (lose all but)		
㊿ ✓ WHETHER THEY WORK OR NOT		
(51) ✓ housewives		And what about their wives?... Well, we've been looking at them from the point of view of the work they do too, haven't we? But,

VIDEO	KEY	AUDIO
		because their job is taking care of their families, and not working for pay, we have called them ___what___? (pause) (tone)
	CC-3 ANSWER ALOUD	
(52) ✓ youngsters		Yes, housewives. What about the youngsters? For the moment we have looked at them only from the point of view of whether or not they are ________? (pause) (tone)
	CC-3 ANSWER ALOUD	
		Yes, in school.
✓ CC-1 Worksheet		Now look at your worksheet. It shoul look like this. (pause)
(53) ✓ ANIM gen pop pan to #3	✓ CC-3 pointer	Now, let's go on to Apt. #3 where we find these three roommates sharing an apartment. This young lady works as a secretary and this one as a nurse...and the third is a talented musician who cannot find a job.
(54) ✓ secy. & nurse		Well, these two people go to work every day so they belong to a group you have discovered already, don't they...so be sure to add them to the right group.
✓ CC-1 worksheet		That's right, you should now have 4 marks after employed on your worksheet.
(55) ANIM musician		But what about their roommate? She doesn't belong with the employed workers, because she doesn't have a

VIDEO	KEY	AUDIO
		job. However, she is trying to find work, so you will have to put her into a new group of people who are out of work. So--add to your list whatever name you think would best describe this group. (pause)
	✓ CC-3 [illegible] in UNEMPLOYED ✓ OUT OF WORK	If you wrote anything such as un-employed or out of work, fine. Now all you need to do is to be sure you have one mark after it.'
56 r ✓ CC-1 worksheet ANIM ✓ change tilt to #4	✓ CC-3 pointer	Now let's see if you can find any new groups here in Apt. 4. In this family, both the mother and father work. She, as a hairdresser; and he, in a factory. And we also find a grandfather who works as a night watchman. The young man of the family is in high school where he is learning to be a mechanic. (pause)
		So, based on this information every-one here fits into one of two groups you already have on your list... The group called "employed"[redacted]" or the group labeled "in-school", so add them to these groups. (pause)
✓ pan to #5		In Apt. 5 we find a school teacher and his family. His wife takes care of the house. Their daughter is in the fourth grade. Now, based on this information, do you need to add any new group to your list?

VIDEO	KEY	AUDIO
	ANSWER ALOUD	(pause) No,...I think not, but don't forget to add these three to their correct groups. (pause)
✓ pan to #6		Here in the last apt. we find a very old man who stopped working a number of years ago, and he is now retired. Does he belong to any of the groups you have listed so far--or have we come across still another group that you need to add to your list? ~~Well~~ Remember, he isn't employed, although he once was...and he isn't looking for work. What group does he belong to?...Well, he used to work, but he has now reached the age when he doesn't have to work any more. (pause)
	✓ RETIRED (fade in)	Can you think of a good name to give to the group he belongs to? (pause) Yes, the word "retired" is used to describe people who have reached the age when they no longer have to work.
[redacted]		Don't forget to put one mark for this man next to the group he belongs to.
✓ CC-1 LOOK OVER YOUR LIST		Now, take a moment to look over your list. Add up the number of people in each group. Put the totals in the totals column. (pause)
BLACK		

VIDEO	KEY	AUDIO
		Now listen as I give you the correct totals for each group. If you have a wrong total, be sure to correct it. Employed...eight In-school...four Preschool...one Housewives...three Unemployed...one Retired...one (pause)
(58) ✓ **ANIM** apt house pop		Remember when we first looked at this population? We grouped ~~them~~ its members simply as men, women, and children, and then as males or females. Then with more information, you found you were ~~able to~~ looking at the
	✓ CC-3 POINT OF VIEW WORK	adults in this population from the point of view of work. And looking at the adults from this point of view, you found that
(59) ✓ employed		some worked at regular jobs
(60) ✓ unemployed		~~others were~~ one was unemployed ~~and~~ but looking for work,
(61) ✓ housewives		some worked at home as housewives
(62) ✓ retired		and, finally, one was retired and no longer had to work.
	✓ (pull) POINT OF VIEW SCHOOLING	
(62a) gen pop		You looked at the young people from the point of view of schooling.
(63) ✓ school children		You found that all but one were in school...
(64) ✓ preschooler		and that this little girl hadn't started school yet.

VIDEO	KEY	AUDIO
(65) YOU HAVE BEEN LOOKING AT THIS POPULATION FROM TWO DIFFERENT P____ OF V____	CC--3 ⑤ (⑤ out)	In other words, based on the information I gave you, you have been looking at this population from two different ___what___? (pause) (tone)
(66) POINTS VIEW (67) THE POINTS OF VIEW OF WORK SCHOOLING ~~THE~~ POINT OF VIEW OF (68)	CC-3	Yes, from two different points of view. The point of view of work and the point of view of schooling. But, do you think that you can give a good overall picture of a population by just looking at its members from just these two points of view? (pause)
	ANSWER ALOUD	
gen pop		Well, you really can't--but it isn't easy to say just what other points of view you should use in order to get as good an overall description as you possibly can.
(69) WHAT RELIGIOUS GROUPS THEY BELONG TO? (over gen pop)	CC-3 ⑥ ⑥ out	For instance, to get a good overall picture of this population should you look at its members from the point of view of what religious groups they belong to? (pause) (tone)
(70) WHAT POLITICAL GROUPS THEY BELONG TO? (over gen pop)	CC-3 ⑦ ⑦ out	Well, now do you think you might want to look at them from the point of view of what political groups they belong to? (pause) (tone)

VIDEO	KEY	AUDIO
71 gen pop		Now here's one I want you to answer out loud:
72 WHAT DAYS OF THE WEEK THEY WERE BORN ON? (over gen pop)	ANSWER ALOUD	Do you think getting a good overall description of this population should include looking ~~look~~ at these people from the point of view of what days of the week they were born on? Well, ~~while~~ it might be interesting, ~~this~~ to know ~~[illegible]~~ the days of the week people are born on, but this P. of V. ~~point of view~~ wouldn't add very much to a good overall picture, would it?
74 WHAT THEY DO FOR RECREATION ~~[illegible]~~? (over gen pop)	CC-3 ⑧	But, what about looking at this population from the point of view of...what its members do for recreation or relaxation? (pause) (tone)
73 WHAT RACE THEY BELONG TO? (over gen pop)	CC-3 ⑨	Now let's see if you think an overall picture of a population should look at it from the point of view of the different races its members belong to? (pause) (tone)
75 gen pop		Well, these are some of many possible points of view that you may feel ought to be included in an overall ~~[illegible]~~ description of this or any other population. Can you think of some other ~~s~~ points of view? (pause) I hope so, because
~~ANIM~~ ~~[illegible]~~ (reverse pan)		In a moment your teacher is going to ask you and your classmates to decide on what different points of view you think will help give a good overall description of this population.---After you have done this, you are then going to be shown how you can get all the information you need to arrange the members of this

VIDEO	KEY	AUDIO
		population into groups, according to the points of view you have decided on. But before you start deciding what points of view you are going to include, here's one last question for you.
76 ✓ ANIM ARE YOU GOING TO BE ABLE TO LOOK AT THIS POPULATION FROM EVERY POSSIBLE POINT OF VIEW?		Are you going to be able to look at this population from every possible point of view and arrange its members into every group imaginable?
	CC-3 ANSWER ALOUD	(pause) (tone)
77 ✓ NO 78 gen pop		Well, I hope you said "no", because, for instance, I doubt for instance that you will be looking at these people from the point of view of what they eat for breakfast, or arranging them into groups according to their favorite colors.
79 ✓ ANIM YOUR JOB IS TO CREATE AS GOOD AN OVERALL DESCRIPTION OF THE APARTMENT HOUSE POPULATION AS YOU CAN. 80 ~~Anor~~ gen pop		So your job between now and the next program is to create as good an overall description of the apartment house population as you can. and to do this you will have to look at these people from many points of view... as many as you think will help you give a good overall description of the population they form.
BLACK		

APPENDIX B

Field Test Form, May 23-27, 1966

TEACHER'S GUIDE

to

"Changing Populations in a Changing World"

Three Experimental Instructional Television Programs

Prepared by

The Institute of Educational Technology

Teachers College, Columbia University

and

WETA-T.V. Channel 26, Washington, D.C.

Under Contract OE-4-16-034

Title VII Section B, National Defense Educational Act

United States Office of Education

Department of Health, Education and Welfare

Things to be done before the start of the first program on the morning of May 23, 1966. (Please plan enough time to do these six things before the program starts)

1. Be sure that each child has a worksheet.
2. Be sure to tell the children that the worksheet is their's to keep for review purposes. Use it for a quick review before the next lesson starts.
3. Be sure to say that no one is going to grade the answers they write down during the program. Tell them also that the reason we want them to answer questions is that we have found that students who take the trouble to answer questions during a program are more apt to learn from the program.
4. Be sure to tell the children that when we want them to write on their worksheets they will hear a tone and see a number with a circle around it, i.e., ① appear during the program. This means they are to answer that question on their worksheet. When they hear a tone and see the words "answer aloud", they are to just say the answer out loud (later in the programs the tone alone, will signal them to answer aloud).
5. Be sure to tell them that they are to keep their worksheets from lesson to lesson, and use them to review what they have done during the program.
6. Tell them that each of the television programs will be followed by a homework assignment that will help them use what they have learned during the program.

Instructions to the Teacher for Classroom work and Homework following

Program I of the

Experimental TV Programs "Changing Populations in a Changing World"

Program I "Describing a Population"

What the students do during the lesson:

During the first lesson the student has been introduced to the idea of looking at a population from different points of view and the idea that when a person sets out to describe or study a population he must choose points of view he is going to use in order to get a "good overall description". He also has discovered that describing a population means arranging its members into the groups that are discovered within the population when it is looked at from specific points of view. During the lesson, the student has only looked at the apartment house population of 18 people that he is studying from the points of view of "work" and "schooling". Other points of view such as "religion", "recreation", "race", "politics" are suggested as important and helpful in getting a good overall description of this population, but this job is far from finished. This is where the teacher comes in.

What the teacher is asked to do with the students following the lesson:

The job the students are faced with after the lesson is finishing constructing a good overall description of the population of the apartment house (18 people)

The teacher is to point out first that the apartment house population is pictured on the back of the worksheet, so that each child has this visual as a reference for finishing the job of describing the population.

The teacher then is to raise the question of what points of view (in addition to "work" and "schooling") ought to appear on this list. The class is then to create a list of points of view that they feel would help them give a good overall description of the population. This list should have at least 10 points of view. As the list is being made up, get the students to question the usefulness of each point of view as it is suggested: "Does this point of view" really help us get a good overall description, or are there better points of view we ought to have on our list?" Constantly raise the question of whether the list will lead to the best overall description possible.

When the list is complete, the teacher should then ask the class to make up information about each member of the population from each of the points of view on the list. For instance, if there are 28 children in the class, it would be a good idea to come up with a list of 14 points of view. Then assign the children to work in pairs, with each pair creating information about each homework assignment. If the class comes up with as many points of view as their are children in the class then, of course, each child may work alone making up information about each of the 18 people in the apartment house from the point of view he has been assigned.

The next day in class (Tuesday) the children should each make a list of the points of view being used, and then each pair or team (or child, if they have worked alone) should give the information they have created about each member of the population from the point of view they were assigned.

The teacher should work on the blackboard writing down the groups that are formed under each point of view. Different children can be called upon to work at the board recording the tallies in each group. The rest of the class may do the same on paper at their seats if you like.

Important: Whether or not the children work in pairs or alone when creating information from a point of view really doesn't matter. What does matter very much is that all the points of view on the list be ones that are helpful in getting a good overall description of a population. So don't encourage them to come up with a long list simply in order to assign each of them a point of view to work on. Be satisfied with fewer points of view in order to get ones that you and the class agree are important.

Instructions for Classroom Work and Homework following Program II

Program II - "How Populations Change"

During Program II the students have the job of looking at the apartment house population a year later and describing and recording some of the changes that took place within it during a one year period. The are taught to identify five happeings or things that are constantly taking place within most populations and which cause populations to change.

Three of these: "Births", "Deaths", and "Moves" (in and out of a population) can cause changes in both the size and the makeup of a population. Two of these: "Learning" and "Aging" cause changes only in a population's makeup. Of course, these are not the only things that cause such changes, but these are some of the most obvious and important ones (in one of our test groups a child said "a depression" was an event that causes change in the makeup of a population--and, indeed, it does--so in following up this program encourage the children to come up with other causes of change besides the five mentioned during the program.

The Follow-Up Assignment--

The assignment given to the class at the end of the program is to record changes that are occurring within their own population (their own community).

In order for them to carry out this assignment you should follow-up the program by first restating the assignment and checking to see that they understand it.

When you have done this, you should ask whether there are any points of view which they hadn't used in describing the apartment house population from which it might be helpful to look for changes in the makeup of their own population.

Once the children have decided upon the points of view from which they will look for changes in their community, each child should make a copy of the list that has been agreed upon (it may very well be the same list used to describe the apartment house population). They will need this list to do the homework assignment.

For homework each child should try to think of specific changes that he knows about that have recently occurred in the makeup of his own population from the points of view on his list. In doing this he should identify the groups that have been affected by each change he describes.

Instructions for Classroom Follow-up of Program III

Program III - "Comparing Changing Populations"

During this program the children will compare the makeup of their own population with the makeup of a tribe of very primitive Australian Aborigines. They will, of course, discover some striking differences, for some of these tribes have changed little in makeup or in size for 30,000 years.

However, at the end of the program the children are asked how well they think these Aborigines might be able to change and enter into the modern world. Having been asked this question, the children are shown a film of some of the changes that these natives have undergone since 1951 when the Australian government began to train them to enter the modern world

As they look at this film the children are asked to identify the points of view from which the Aborigines are changing. They are also asked to spot any new groups within the population because of the changes that have occurred.

All you need to do is ask them to write down the new groups they have spotted and the points of view to which these groups are related. This should take no more than five minutes.

At this point on Friday, May 27, the children will be tested on the work covered in all three lessons.

APPENDIX C

(Form A) Name ____________________

T.C. T.V.
(Final Pre-Posttest) Date ____________________

1. Two astronauts in a space capsule in outer space may be called a population.

   Yes ____ No ____ I don't know ____

2. A large group of people living in a city, state, or country may be called a population. Yes ____ No ____ I don't know ____

3. A small group of people constantly moving from one place to another on foot may be called a population. Yes ____ No ____ I don't know ____

4. May a population contain just one person?

   Yes ____ No ____ I don't know ____

5. If you were asked to give a good, overall description of the makeup of a population, are there certain points of view you would always be sure to use?

   Yes ____ No ____ I don't know ____

   If "Yes", name at least six that you would use. ____________________

   ____

   ____

6. The members of a population may be arranged into ________ such as ____________ and ____________ according to the ____________ of ____________ of work.

7. Before you start to study the makeup of a population, always be sure to answer these three questions that help you identify the population you are going to study:

   1. ____________________
   2. ____________________
   3. ____________________

8. The U. S. Census is held every ____________ years.

9. Name five things or happenings that can cause a population to change. Put an "X" next to those that can cause a population to change both in size and makeup, and an "O" next to those that can only cause change in the makeup of a population.

1. ________________ ( )
2. ________________ ( )
3. ________________ ( )
4. ________________ ( )
5. ________________ ( )

10. All populations should be studied from the same points of view.

Yes ____ No ____ I don't know ____

11. Using at least two points of view show how a primitive population may have less variety than a modern population.

____

____

____

12. a) If a country has the exact same number of people in it in two different years, its population is changing in:

SIZE ☐

MAKEUP ☐

both SIZE and MAKEUP ☐

neither SIZE nor MAKEUP ☐

b) If a country has a different number of people in it in two different years, its population is changing in:

SIZE ☐

MAKEUP ☐

both SIZE and MAKEUP ☐

neither SIZE nor MAKEUP ☐

13. What are the three steps you would follow to study change from one year to the next in the makeup of a population?

____

____

____

____

14. Name a point of view you would not use in describing a particular population, and tell why you would not use it. ____________________

____

____

15. What is the U. S. Census? ____________________

____

____

16. In order to give a good, overall description of the makeup of the population of your state, you would first decide on what __________ of __________ you are going to use, and then, as you look at each member of the population, the information you get helps you arrange them into the __________ that form the __________ of the population.

Would you follow the same steps in order to give a good, overall description of the population of an American Indian Reservation?

Yes ____ No ____ I don't know ____

17. a) Write down a list of groups you might find in a population when looking at it from a particular point of view, then lable the list according to the point of view you have picked.

Groups

____

____

____

____

____

Point of View ______________________

b) Do the same thing using another list of groups and another point of view.

Groups

____

____

____

____

____

Point of View ______________________

18. When you are comparing a primitive population with a modern population, you should use:

☐ THE SAME POINTS OF VIEW

☐ DIFFERENT POINTS OF VIEW

☐ I DON'T KNOW

What are some of the differences you would expect to find between the primitive population and the modern population? ____________

19. The groups you discover by looking at one population from a certain point of view will be exactly the same groups you would discover no matter what other population you look at from that same point of view.

Yes ____ No ____ I don't know ____

20. Name some changes that have occurred recently in the groups that make up your own population. Identify the point of view that is connected to each change you have named.

Point of view ____________

Change that occurred ____________

Point of view ____________

Change that occurred ____________

Point of view ____________

Change that occurred ____________

(Form B) Name ____________________

T.C. T.V.
(Final Pre-Posttest) Date ____________________

1. Two people in a small boat may be called a population.

Yes ____ No ____ I don't know ____

2. All the people in your town may be called a population.

Yes ____ No ____ I don't know ____

3. A small group of people in a bus may be called a population.

Yes ____ No ____ I don't know ____

4. What is the smallest number of people a population may contain? ____________

I don't know ____________

5. Are there some points of view you would be certain to use in order to give a good, overall description of the makeup of any population?

No, none at all ______ Yes, at least six ______ I don't know ______

If "at least six", what are they? Why would you use them and not six others?

____

____

6. By looking at a population from the ____________ of ____________ of work, you can organize its members into ____________ such as ____________ and ____________.

7. How often is the U. S. Census conducted? ____________________

8. Name three happenings that cause a population to change in both size and makeup. 1. ______________ 2. ______________ 3. ______________

Name two happenings that cause change only in the makeup of a population.

1. ______________ 2. ______________

9. Three questions you should ask to help identify a population you are going to study are:

1. ______________

2. ______________

3. ______________

10. All populations that you study should be studied from the same points of view. Yes ____ No ____ I don't know ____

11. Using at least two points of view, show how a modern population has more variety than a primitive population.

____

____

____

____

12. In 1900, the population of Mudville was 3,200, and in 1965 it was 6,550. The population of Mudville changed between 1900 and 1965 in:

SIZE ☐

MAKEUP ☐

both SIZE and MAKEUP ☐

neither SIZE nor MAKEUP ☐

In 1900, the population of Lonelyville was 2,110, and in 1965 it was 2,110.

The population of Lonelyville changed between 1900 and 1965 in

SIZE ☐

MAKEUP ☐

both SIZE and MAKEUP ☐

neither SIZE nor MAKEUP ☐

13. The U. S. Census is what the government does in order to ____________________

____

____

14. In order to study how the makeup of a population is changing from one year to the next you first ____________________

____

____

and secondly you ____________________

____

and, then, when you have done these two things you ____________________

____

____

15. The steps you would follow in giving a good, overall description of the makeup of the population of your county are: First, decide which __________ of __________ you are going to use; and then use the information you get from looking at each member of the population to help you arrange them into __________ that form the __________ of the population. Would you use these same steps to give a good, overall description of the population of an African Tribe? Yes ____ No ____ I don't know ____

16. When you look at two populations from the same point of view, you will find the same groups. Yes ____ No ____ I don't know ____

17. If you were comparing a primitive population with a modern population, you would look at both populations from:

☐ THE SAME POINTS OF VIEW

☐ DIFFERENT POINTS OF VIEW

☐ I DON'T KNOW

Name some of the differences you would expect to find between a modern population and a primitive population. ______________________

____

____

18. Name 2 points of view you might use in studying a population and then write down the groups suggested by the points of view.

Points of view: 1. ____________ 2. ____________

Groups	Groups
____________	____________
____________	____________
____________	____________
____________	____________
____________	____________

19. Name a population and write down a point of view you would not use in studying it. Then tell why you would not use that point of view.

Name of population ______________ Point of view ______________ Why I would not use it ____

____

____

____

20. Identify some points of view from which changes have occurred in the makeup of your own population recently. Name the specific changes that are connected with these points of view (what groups within your population were changed?).

Point of view ______________________

Change that occurred ______________________________

____

____

Point of view ______________________

Change that occurred ______________________________

____

____

Point of view ______________________

Change that occurred ______________________________

____

____

APPENDIX D

Lesson 1

WORKSHEET

NAME ______________________________ DATE ______________________________

① You can find a population just about ________________________

② A population can be of any __________________.

③ There are exactly _________ people in the apartment house population.

GROUPS	TALLIES	TOTAL
MEN	𝍸 |	6
WOMEN	𝍸 ||	7
CHILDREN	𝍸	5
MALES	𝍸 |||	8
FEMALES	𝍸 𝍸	10
____________________________	___________	______
____________________________	___________	______
____________________________	___________	______
____________________________	___________	______
____________________________	___________	______
____________________________	___________	______

④ What Point of View have we been using to look at the two men?

☐ What they do for relaxation.

☐ What kind of food they like.

☐ Whether they work or not.

⑤ You have begun to look at this population from two different _____________

of _____________.

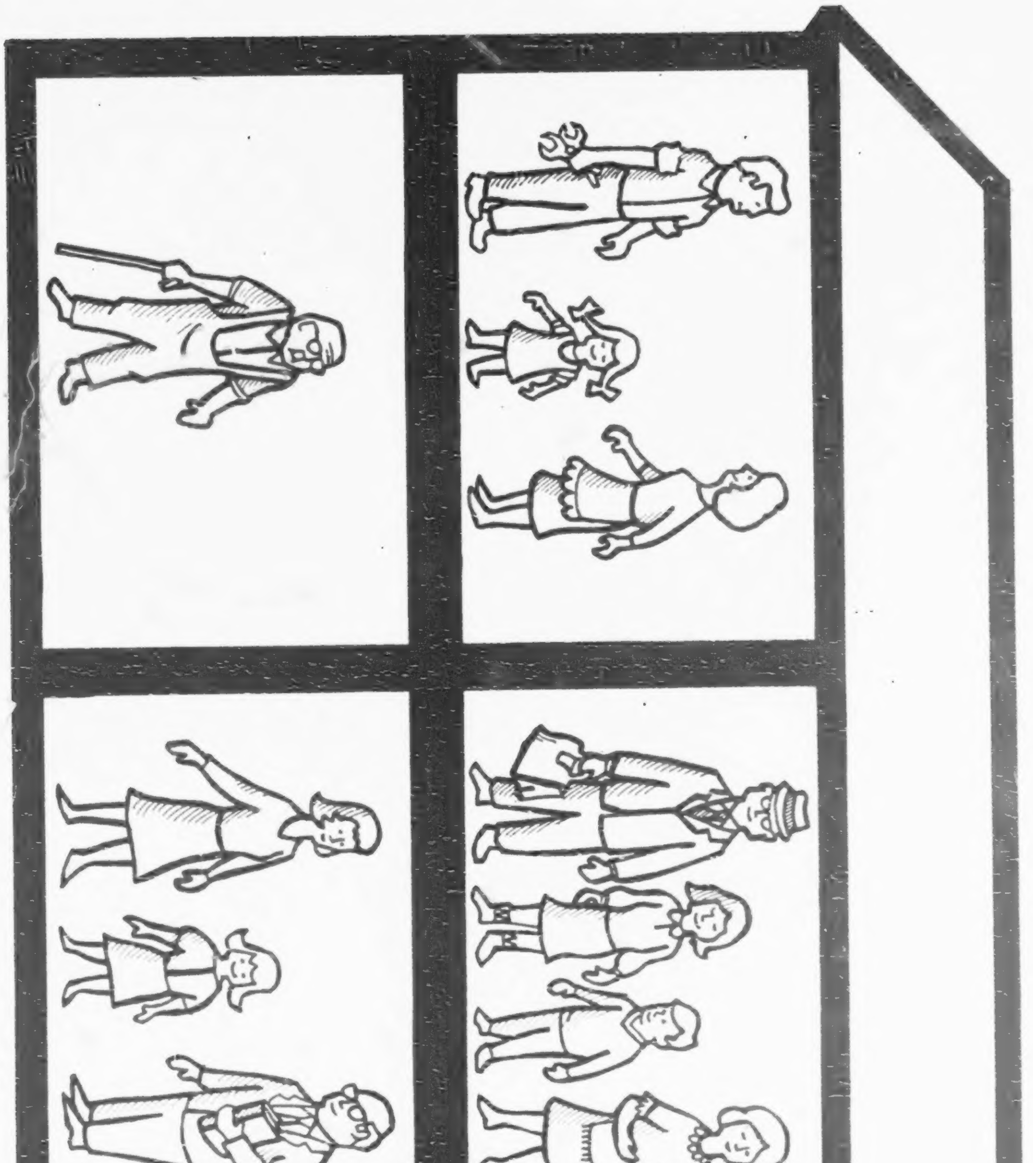
To get a good overall picture of the apartment house population, should you look at its members from the point of view of:

⑥ What religious groups they belong to? _________ (yes or no)

⑦ What political groups they belong to? _________ (yes or no)

⑧ What race they belong to? _________ (yes or no)

⑨ What they do for recreation? _________ (yes or no)



Lesson 2

WORKSHEET

NAME ______________________________ DATE ________________________________

① Any group of people anywhere may be called a ________________________.

② In order to give a good overall description of a population:

☐ (a) You must make sure to look at it from every possible point of view and then arrange the members of that population into every possible group.

☐ (b) You must decide what points of view are the most important to use in describing a population and then arrange the members into groups according to the points of view you have chosen.

③ Your description of this apartment house population was in the year of the last U. S. Census, or the year ____________.

④ Did the population of the apartment housechange in size between 1960 and 1961? ______________ (yes or no)

GROUPS	1960 TOTALS	1961 TALLIES	1961 TOTALS	(+/-) same
EMPLOYED	8			
IN-SCHOOL	4			
PRE-SCHOOL	1			
HOUSEWIVES	3			
UNEMPLOYED	1			
RETIRED	1			

⑤ From 1960 to 1961 the MAKEUP of the RETIRED group had completely ___________.

⑥ The size of the apartment house population did not change from 1960 to 1961 but it did change in ______________.

⑦ Three familiar happenings that have caused changes in the apartment house population are:

____

____

____

⑧ __________________________________

⑨ __________________________________

⑩ Aging and Learning can only cause changes in:

SIZE ☐
MAKEUP ☐ (check one)

⑪ Studying populations means studying the ways in which populations

______________________.

Lesson 3

TC 3B

WORKSHEET

NAME ______________________________ DATE ______________________________

① The changes you discovered in your community were

☐ SIMILAR TO

☐ DIFFERENT FROM

the kinds of changes you discovered in the population of the apartment house.

② Even if the five causes of change you have studied aren't changing the SIZE of your community's population, they are constantly changing its

________________________.

③ Many different happenings are constantly causing changes in the makeup of your population from just about any __________ of __________.

④ In my opinion, it would have been

☐ MORE

☐ LESS

important and useful to look at the population of my community from the point of view of SLEEP than from any of the points of view I did use.

⑤ From the point of view of WORK, one of these populations has more variety and a greater number of groups. Which one?

☐ THE ABORIGINES

☐ YOUR POPULATION

⑥ ☐ (a) None of these points of view would be useful in studying the aborigines.

☐ (b) No more than a few of these points of view would be useful in studying the aborigines.

☐ (c) There is no question that all of these points of view would be useful in studying the aborigines.

☐ (d) Each point of view would have to be tested to find out which was useful in studying the aborigines.

☐ (e) Only about half of these points of view would be useful and important in studying the aborigines.

⑦ ☐ (a) You would probably find more groups and more variety from each point of view in the primitive population than you would in your own population.

☐ (b) You would probably find more groups and more variety from each point of view in your own population than in the primitive population.

⑧ The points of view we have been using in these programs are:

☐ (a) The only points of view you would ever need to use to describe any population.

☐ (b) Should be used in describing any population.

☐ (c) Should be used, but are not the only points of view you might need in describing any population.

APPENDIX E

[EXCERPT]

Working Paper #1

Six TV Project

Institute of Educational Technology

Teachers College, Columbia

by
George W. Carey
Dep't. of Social Studies
July, 1964

In order to plan for a teaching program in ecological skills successfully, there are five areas which must be treated in detail. These are: the methodological structure of ecological inquiry; the case study content employed to elucidate the methodology; the specific aims of the program relative to the students; the treatment of the content and methodology to bring it to the level of the students; the means of evaluation employed to gauge the success of the program. The Program itself will be prepared for educational television under two hypotheses: a taped program can efficiently be employed to motivate and teach students ecological method above and beyond the specific subject matter content, and the average elementary school social studeis teacher is not specifically trained to perform that function.

METHODOLOGICAL STRUCTURE

The ecology of communities, especially human urban communities, is customarily regarded as the relationship of a specific human population to its environment. Early human ecologists adopted a biological view of their discipline, reasoning by analogy from plant and animal ecology. Thus, scholars like Park, Burgess, and later Hawley employ such concepts as climax, dominance, invasion, segregation, commensalism, symbiosis, and many others drawn from biological ecology. The unit of study is the population. This early view has been found to be overly simplified for various reasons. Mankind, to a degree far beyond other species, modifies its environment. Adaptation is therefore a two-way street, in the human case. Mankind opts among various alternatives in social organization, and consciously shapes and modifies its social organization in a way untypical of other species. Relationships between members of a population are often of great significance to the ecology of that population: thus, ignoring the internal analysis of populations is fraught with definite methodological risks.

Many modern urban ecologists try to grapple with these problems by recognizing four aspects to the ecological community: the population, the environment, the technology and the social organization of the community. The interaction of each of these with all the others will yield a more adequate model of the ecology of a community than the purely biological analogy.

Note: This section describes the content of the three lessons that make up the Final Version of the series.

The Population:

The ecologist seeks to know the following things about the population of the community, as a departure point for his study:

1. the size of the population
2. the makeup of the population by sex
3. the makeup of the population by age
4. the makeup of the population by race
5. the makeup of the population by employment
6. vital statistics: birth rate, death rate, rate of increase or decrease
7. makeup of population by pertinent cultural variables such as religion, families, divorce rate, level of education, place of origin
8. reliability of available data
9. trends in time for these variables (#1 through #7)

Note: This section describes the content of the three lessons that make up the Final Version of the Series.

The Environment:

This aspect of the ecologist's study may be analyzed in terms of the following variables:

1. The Climate
    - (a) Temperature characteristics
    - (b) Pressure characteristics
    - (c) Humidity and Precipitation characteristics
    - (d) Winds and Storms
    - (e) Climatic accidents (tropical cyclones, tornadoes, etc.)

2. Land forms (relative arrangement of land in various classes of slope, relief and altitude; classes of shoreline, river valleys, etc.)

3. Soils (Zonal, intrazonal and azonal types and occurrence)

4. Biotic resources
    - (a) Plants
        - i for food use
        - ii for non-food use
    - (b) Animals
        - i for food use
        - ii for non-food use
    - (c) Plants and animals which control the success of those enumerated in (a) and (b) above

5. Mineral Resources
    - (a) Water
    - (b) Fuel minerals
    - (c) Non-fuel minerals
        - i non-metallic
        - ii metallic

6. Location; the relationship of the community with respect to contiguous regions, and to noncontiguous, but related regions

Technology:

Technology includes the body of techniques and tools brought to bear on the tasks of providing the community with its needs.

1. Agricultural technology
    - (a) Water management
    - (b) Soil management
    - (c) Applied plant genetics
    - (d) Applied animal genetics
    - (e) Pest control
    - (f) Processing, storing and marketing techniques

2. Technology of energy
    - (a) draught animals
    - (c) organic non-fossil fuel use
    - (d) hydraulic energy
    - (e) electrical conversion
    - (f) solar energy
    - (g) wind energy
    - (h) geothermal energy
    - (i) nuclear energy
    - (j) other energy sources

3. Metallurgy
    - (a) ferrous metallurgy
    - (b) ferroalloy metallurgy
    - (c) base metals
    - (d) light metals
    - (e) others

4. Chemical Technology
    - (a) industrial chemicals
        - i acids
        - ii alkalies includes fertilizers
        - iii alcohols
        - iv gases
    - (b) glass
    - (c) organic and pharmaceutical chemicals
    - (d) others

5. Manufacturing
    - (a) food processing
    - (b) textiles
    - (c) machinery
    - (d) transportation equipment
    - (e) consumer durables

    (f) consumer non-durables
    (g) handicrafts
    (h) others

6. Health and medical technology

7. Raw, semi-finished, and finished materials of shortage and surplus

8. Time trends in technology

Social Organization:

In countless numbers of human communities, a population employs technology and the resources of its environment through its distinctive kind of social organization to modify, or in some cases, to change completely that environment. Environmental determinism is the exception, rather than the rule. An analysis of social organization may proceed under the following categories.

1. Governmental structure
    (a) the sources of political authority
    (b) the mechanisms for exercise of authority
    (c) relations with other communities
    (d) limitations on authority
    (e) the government and the ownership of property

2. The characteristics of the society
    (a) the culture and its transmission
    (b) groups within the society
    (c) social differentiation: roles of men, women, children, the family, class and caste, religion

3. Economic organization
    (a) ownership of capital
    (b) availability and organization of labor
    (c) incentives and economic goals
    (d) money, credit and banking

(e) the pattern of tertiary activity
(f) the pattern of quaternary activity
(g) distribution of income
(h) nature of the market
(i) foreign exchange

4. Social, political and economic changes

Concluding Note:

The ecologist will, in the course of library research, provide himself with as much of the above data as possible on the community which he intends to study, and then compile a list of material which he lacks. In the field, he will endeavor to verify or reject what he has gleaned from secondary sources, and secure the date which he lacks. Ordinarily, one individual is not equally competent in each of the four designated aspects of community ecology, and so it will ordinarily be necessary for a team of individuals having supplementary skills to carry out a complete investigation.

[EXCERPT]

AN OVERVIEW
of
SIX VIDEOTAPED LESSONS
ON ASPECTS OF HUMAN ECOLOGY

(Target population Sixth Grade)

LESSON	WORKING TITLES
Lesson I	Population and Environment
Lesson II	Technology
Lesson III	Social Organization
Lesson IV	Case Study (the M'Zaab Region of Algeria)
Lesson V	Case Study (Morrisville, Pennsylvania)
Lesson VI	Critical Analysis of an Undecided Case Study

December 1964

STATEMENT OF
GENERAL AND LESSON-BY-LESSON OBJECTIVES
FOR SIX VIDEOTAPES PROGRAMS
TO BE PRODUCED
UNDER U.S.O.E. CONTRACT

This series of videotapes deals with the teaching of the fundamental concepts, skills, and procedures used in the study of the way men manage to live in a variety of environments. The objectives to be achieved by this series may be stated in two ways:

1. General Objectives which will be developed in a cumulative fashion throughout the series;

2. the specific, more detailed statements of objectives implicit in these general objectives, around which each of the six videotaped programs are designed.

GENERAL OBJECTIVES: The general objective of this series is to develop within the student those skills, information, concepts and procedures he will need to conduct an analysis of the way in which a given human population manages to live effectively in its environment. The method used to accomplish this objective is to train the student to organize data gathered about a population he is studying into four categories or conceptual frameworks:

1. the concept of population
2. the concept of environment
3. the concept of technology
4. the concept of social organization.

Having received training in the identification and organization of data within this conceptual framework, the student will be trained to recognize the way in which the phenomena within each of these conceptual frameworks interact. This overall objective will be achieved through the use of many and varied examples taken from different populations in various parts of the world. Also a detailed case-study approach to two particular human communities will be used: (1) the people known as Mozabites, a Moslem population living in the area of Algeria known as the m'zaab; (2) the population living in the area of Morrisville, Pennsylvania.

In order to achieve these general objectives, the following sub-objectives have been identified as important:

1. Identify how change in a particular conceptual framework will bring about change in one or more of the other conceptual frameworks.

2. Identify the reliability of the source material and identify gaps information required from sources.

3. Distinguish between (a) a map-vertical and oblique photos, (b) ground surveying techniques, and (c) physical maps.

4. Identify differences between different types of populations, specifically major or important population characteristics in the people living in the m'zaab as contrasted with the people living in Morrisville.

5. Identify contrasts between economic patterns, political patterns, and the physical geography of different regions.

6. Identify the reasons why it is difficult to develop a comprehensive understanding of any population. (Resist applying the conclusions reached through the analysis of one population in its environment to other populations in their environments.

BEHAVIORAL OBJECTIVES FOR TC 1C
Lesson on Population and Environment

1. Given a mass of data about a population living in an environment, the student will be able to categorize that data appropriately under the headings

   (a) population
   (b) environment
   (c) subpopulations

2. Under the heading, POPULATION, the student will list:

   (a) groups of animals
   (b) groups of people

He will not list non-living things under that heading.

3. Under the Heading, SUBPOPULATIONS, the student will list subgroups within a population.

4. Under the heading, ENVIRONMENT, the student will list:

   (a) anything near or around a population
   (b) such factors as location, weather, climate, natural resources
   (c) other populations nearby

5. Given a population is in an unsuitable environment, the student will list three possible courses that population might take:

   (a) to move away from that environment
   (b) to adapt to that environment
   (c) to modify that environment

6. The student will identify visual instances of a population adapting to and modifying an environment.

BEHAVIORAL OBJECTIVES FOR TECHNOLOGY (TC 2a)

Lesson on Technology

1. The student will recognize examples of technology.

2. The student will reject as technology examples of behavior which is:

    a. the result of accident
    b. the result of ritual or superstition
    c. instinctive
    d. not an improvement over past behavior

3. The student will compare technological artifacts for

    a. ease of operation
    b. improvement in results obtained
    c. esthetic value
    d. others

Possible Objective.

4. a. The student will identify instances of the "feedback" cycle which tends to lead to technological advance. (Technological advances make other technological advances possible and likely)

    b. The student will identify instances of technological obsolesence.

    c. The student will identify instances of technological malfunction.

5. The student will, in looking at data about the technology of a population, be able to list kinds of technology such as:

    a. energy
    b. communications
    c. food and water
    d. metal
    e. health and medicine
    f. others

6. Given several definitions, the student will be able to select the one which best defines TECHNOLOGY.

7. Given examples, the student will be able to identify skills and tools, respectively when they are mentioned.

BEHAVIORAL OBJECTIVES FOR TC 3a

Lesson on Social Organization

Given a case history presented in the form of an ecological analysis, the student will be able to perform the activities indicated below. In the event the case history is not complete or specific enough to allow a given activity to be carried out as stated, the student will be expected to recognize this fact and say so.

1. Identify two laws of the population.
2. Compare these laws with the laws of his own population (i.e., are they the same, different, or non-comparable?)
3. Identify two customs of the population.
4. Compare these customs with those of his own population.
5. Identify two mechanisms whereby laws, customs, and beliefs are transmitted from generation to generation.
6. Point out two laws, customs, or beliefs affecting the technology of the population. These examples should be different from those cited in 1 and 3.
7. Explain how the preceding laws, customs, or beliefs (objective 6) have led to changes in the environment of the population, either favorable or adverse.
8. Indicate two ways in which the environment has affected the laws, customs, or beliefs of the population.

In addition to being able to perform the foregoing concrete tasks, the student will be able to deal with certain abstractions as follows:

1. State that a social organization consists not of a body of people, but rather of a collection of laws, customs, and beliefs.

2. Name two of the universal categories into which any social organization can be subdivided (e.g., the government, the economy, the family, religion).

3. State words to the effect that environmental determinism is the exception rather than the rule, and cite two examples from his own experience to prove it.

BEHAVIORAL OBJECTIVES FOR TC 4a

Lesson on a Case Study (the M'zaab Region of Algeria)

In this lesson students will use vocabulary and the concepts used in lessons 1, 2, and 3, applying them to the analysis of data presented in this case study of the M'zaab region. That is, they will identify various subpopulations within the population being studies, identify and organize environmental data about climate, resources, location, other population included in the environments of the Mozabites. The will identify various types of technology used by these people and analyze the way in which the subpopulations identified above are organized into various social groups. The student will make responses indicating that he understands the effect that a change in a particular feature within this case study will have on other factors; e.g., a hypothetical new population possessing a technology new to the M'zaab region will be introduced. The effect of this technology on traditional customs will be studies. Through the use of many examples such as this, the student will be trained to recognize the interactions that exist among the four conceptual frameworks being used in this series of programs.

BEHAVIORAL OBJECTIVES FOR TC 5a
Lesson on a Case Study

(The Morrisville, Pennsylvania, Region)

Practice in applying the skills introduced in Lesson 4 to the study of a different population and environment will be a major objective of this lesson. In addition, the student will be trained to recognize and make judgments about the reliability of source material in the Morrisville and M'zaab case studies; e.g., he will select from a list of source material the more reliable or first-hand data and recognize other information as being of a second- or third-hand nature.

BEHAVIORAL OBJECTIVES FOR TC 6a
Lesson on Critical Analysis of a New Case Study

The objectives of this sixth and final program may be summarized as "training the student to apply the various skills he has developed and applied in the previous two case studies to a less structured case study.

In short the student should (given a description of a population A living in environment x) be able to:

1. Organize the data presented to him.
2. Identify classes of missing data.
3. Identify that important bits of data are missing from many of the classes of data he does have to work with.
4. Select the more reliable data presented to him on the basis of its being of a primary, secondary or tertiary sort.
5. Hypothesize about the effect that specific aspects of technology, environment, etc., may have on other ecological factors such as social organization, etc.
6. Hypothesize about the effect that a new environmental or technological variable may have on other aspects of the environment technology, or on the social organization of the population being studied.